THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LIX. No. 1506.] LONDON, MARCH 22, 1892. [44TH YEAR. PRICE 6d.

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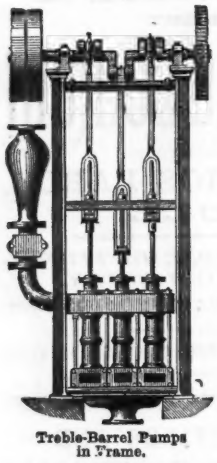
FOR PUMPING TAR, WATER, AND LIQUOR.



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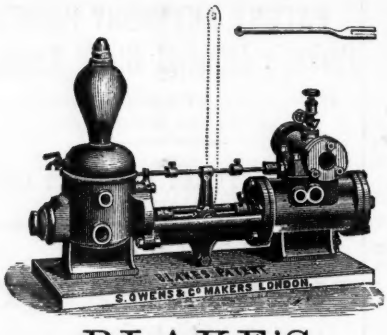

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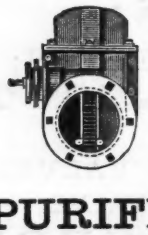

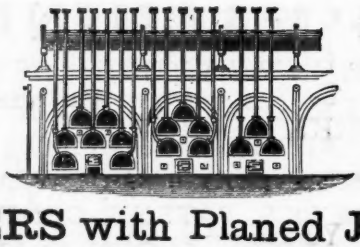

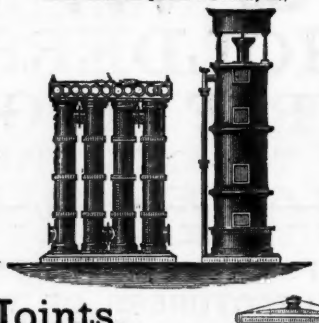

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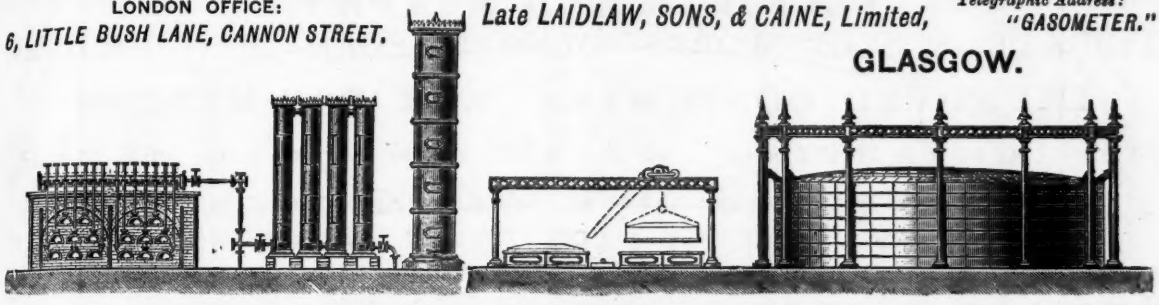

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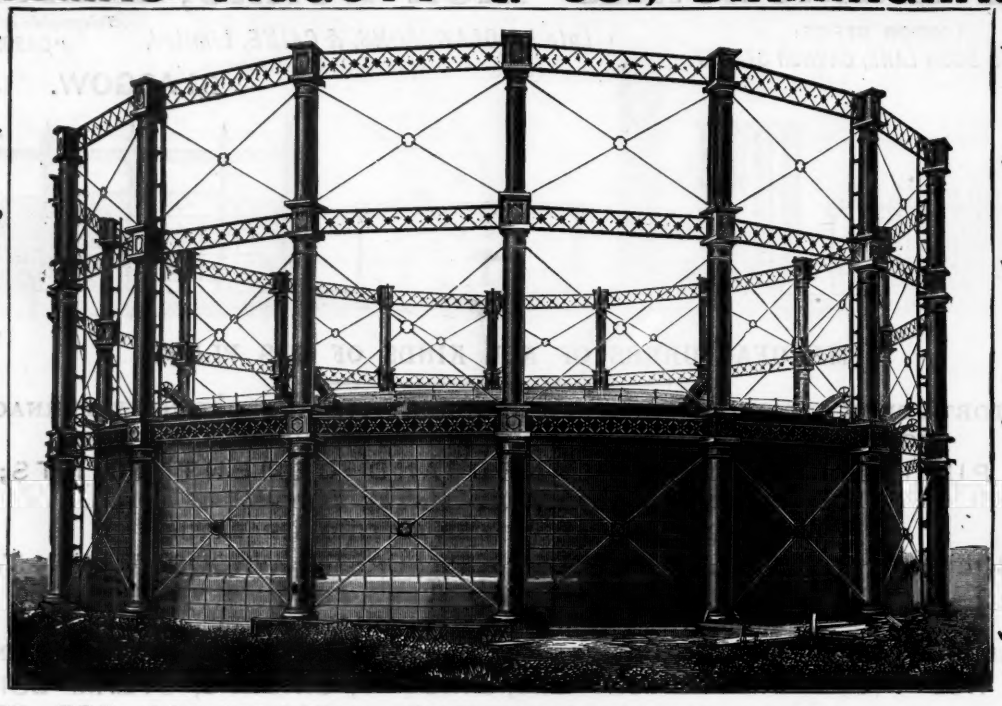

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OVER **180** MACHINES AT WORK AND IN COURSE OF CONSTRUCTION.

Advantages attending its use are:

INCREASED VOLUME of GAS per TON, and INCREASED YIELD per Retort.—The system of breaking and distributing the coals in an even layer in the retorts effecting more perfect carbonization.

REDUCTION in LABOUR and COST of WORKING.—In Works where this System of charging and drawing Retorts is adopted, there has been effected a substantial saving in the cost of Gas Manufacture in the Retort-House; the amount saved varying in different Gas-Works from **8 PENCE** to **15 PENCE per Ton** of coal carbonized. Full particulars will be forwarded upon application to W. G. I. Company, Limited.

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POWER CHARGING AND DRAWING MACHINES, driven by COMPRESSED AIR, STEAM, or ROPE. The power machines are applicable to circular, oval, or ∩-shaped retorts and mouthpieces, and are the most perfect, economical, efficient, and durable machines made. They are constructed on principles founded by long and extensive experience in this special branch of gas engineering and the manufacture of gas.

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Sole Makers of CIRCULAR, OVAL, or ∩-shaped MOUTHPIECES with Morton's Self-Sealing Lids, fitted with

KING'S PATENT FASTENINGS,

secure a very tight joint; and at the same time the eccentric motion given to the Lid effectually removes the Tar from the surfaces of the Joint.

N.B.—The whole of these Fittings are made of Wrought Iron. Several Thousands in use.

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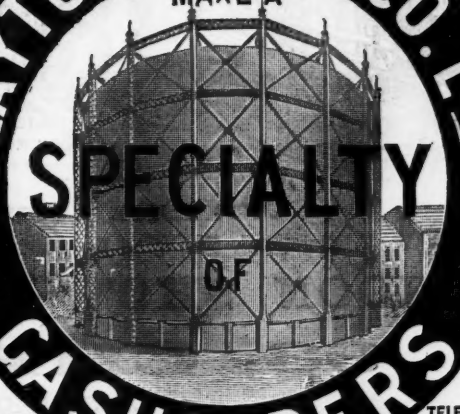

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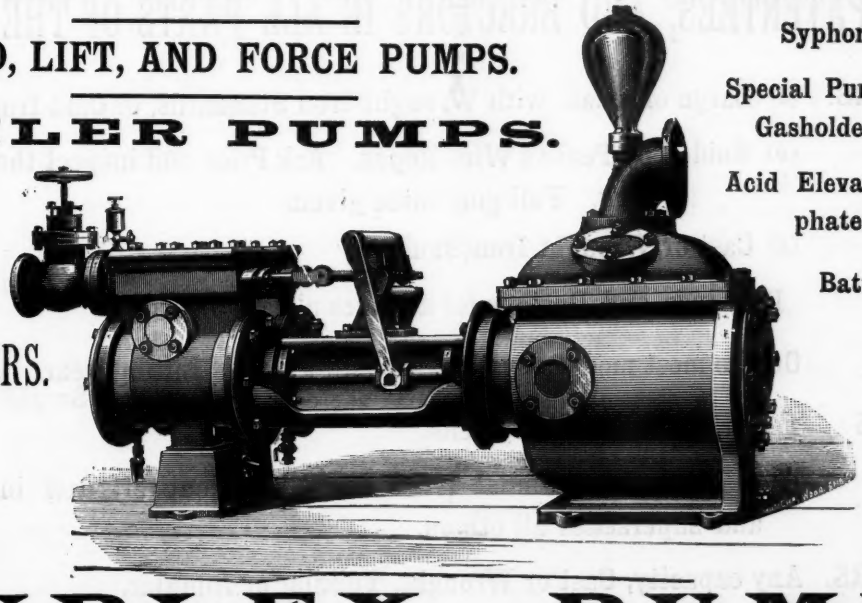

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(*b*) Guided by Pease's Wire Ropes. Ask Price and inspect those already at work. Full guarantee given.

(*c*) Cast or Wrought Iron Tanks.

Drawings and Designs for all sizes always in stock.

PURIFIERS. On the most modern system, with all kinds of Lifting Gear.

SCRUBBERS & WASHERS. Tower, with Canvas Screens.

New Mechanical Radial Washer-Scrubber, entirely new in principle and supersedes all others.

CONDENSERS. Any capacity, Cast or Wrought, Tubular or Annular.

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RESIDUAL-RECOVERY PLANT. The most perfect Ammonia Still yet designed. New patent Saturator, entirely mechanical. Cyanide-recovery Plant.

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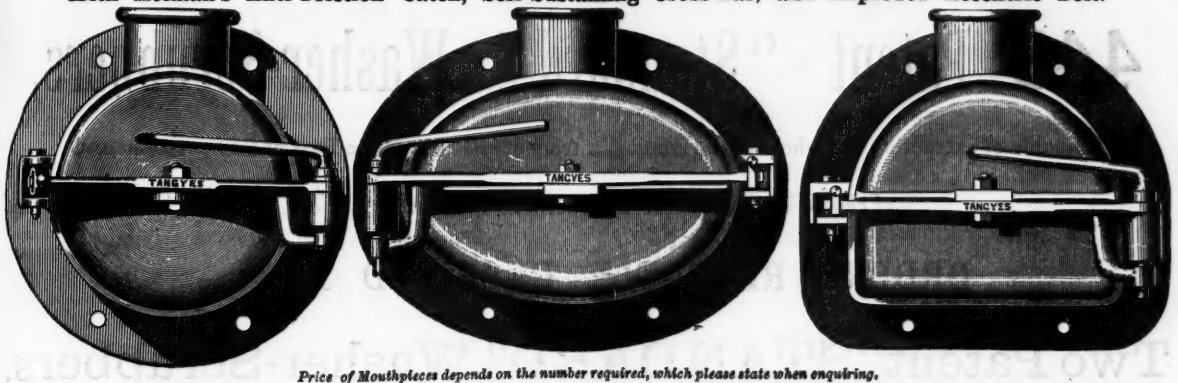
MORTON'S SELF-SEALING RETORT-LID

With Holman's Anti-Friction Catch, Self-Sustaining Cross-Bar, and Improved Eccentric Bolt.



Price of Mouthpieces depends on the number required, which please state when enquiring.

These Retort Lids and Fastenings are in extensive use in most of the Gas-Works in Great Britain, America, and on the Continent, and have almost entirely displaced the older method of sealing by a luting of lime or other material. The Lids are made in three forms, round, oval, and D (as shown above), in each of which we have a very extensive variety of patterns, from which Gas Engineers contemplating the adoption of these lids are recommended to make their selection, in order to avoid cost of pattern making, delays, &c., &c.

Mouthpieces with Circular Lids for Round Retorts.

Pattern No.	Diam. Mouth.	Internal Dimensions of Retort.	Length of Mouthpiece.	Lid and Fittings without Mouthpiece.
3494	14 ins.	14 ins.	12½ ins.	£0 19 0
2982	15 ,,	15 ,,	14 ,,	1 0 0
3453	15 ,,	15 ,,	12⅝ ,,	1 0 0
3497	15 ,,	15 ,,	15 ,,	1 0 0
3830	16 ,,	16 ,,	10½ or 11⅝ ,,	1 1 0
4549	16 ,,	16 ,,	15½ ,,	1 1 0
6232	16 ,,	16 ,,	13½ ,,	1 1 0
6396	16 ,,	16 ,,	15 ,,	1 1 0
7668	16 ,,	16 ,,	17⅝ ,,	1 1 0
10289	16 ,,	16 ,,	11 ,,	1 1 0
3356	17 ,,	17 ,,	15 ,,	1 3 0
7125	17 ,,	17 ,,	6 ,,	1 3 0
933	18 ,,	18 ,,	11⅜ ,,	1 5 0
4045	18 ,,	18 ,,	14 ,,	1 5 0
6397	18 ,,	18 ,,	15 ,,	1 5 0
8013	18 ,,	18 ,,	15 ,,	1 5 0

Taper Circular Mouthpieces with Circular Lids for Round Retorts.

Pattern No.	Front.	Back.			
13001	15 to 21 ins.		21 ins. diam.	13½ ins.	£1 0 0
13261	15 ,, 24 ,,		15 ,,	13¾ ,,	1 0 0
12995	15 ,, 30 ,,		30 ,,	13 ,,	1 0 0
9562	18 ,, 21 ,,		21 ,,	12½ ,,	1 5 0
10425	18 ,, 21 ,,		21 ,,	4½ ,,	1 5 0
13418	18 ,, 22 ,,		22 ,,	12 ,,	1 5 0
13396	20 ,, 20⅜ ,,		20⅜ ,,	4 ,,	1 11 0

Mouthpieces with Circular Lids for D Retorts.

Pattern No.	Diam. Mouth.	Internal Dimensions of Retort.	Length of Mouthpiece.	Lid and Fittings without Mouthpiece.
5348	14 ins.	14 × 18 ins.	7 ins.	£0 19 0
14209	14 ,,	14 ,, 13 ,,	12½ ,,	0 19 0
14231	14 ,,	12⅜ ,, 12⅜ ,,	10 ,,	0 19 0
3463	15 ,,	15 ,, 18 ,,	14 ,,	1 0 0
6678	15 ,,	15 ,, 14 ,,	12 ,,	1 0 0
3661	15½ ,,	15½ ,, 18 ,,	13 ,,	1 1 0
13052	16 ,,	16 ,, 13 ,,	18 ,,	1 1 0
5601	16 ,,	16 ,, 14 ,,	15 ,,	1 1 0
6827	16 ,,	16 ,, 14 ,,	17 ,,	1 1 0
4494	16 ,,	16 ,, 14 ,,	14 ,,	1 1 0
3548	16 ,,	16 ,, 15 ,,	12⅜ ,,	1 1 0
6677	16 ,,	16⅛ ,, 18⅛ ,,	13½ ,,	1 1 0
9645	16 ,,	16⅛ ,, 18⅛ ,,	13½ ,,	1 1 0
4434	16 ,,	17⅞ ,, 14 ,,	14 ,,	1 1 0
6469	16 ,,	18 ,, 14 ,,	15 ,,	1 1 0
9015	16 ,,	18 ,, 14 ,,	18½ ,,	1 1 0
4327	16 ,,	18 ,, 15 ,,	15½ or 19 ,,	1 1 0
8049A	16 ,,	18 ,, 15 ,,	17⅞ ,,	1 1 0
6137	16 ,,	20⅛ ,, 18⅛ ,,	12⅞ ,,	1 1 0
5918	17 ,,	18 ,, 14 ,,	14 or 17 ,,	1 3 0
5053	17 ,,	19⅜ ,, 12 ,,	14½ ,,	1 3 0
7548	17 ,,	20 ,, 13 ,,	15 ,,	1 3 0
6468	17 ,,	20 ,, 16 ,,	15⅛ ,,	1 3 0
4316B	17 ,,	21 ,, 14 ,,	14 ,,	1 3 0
7975	17 ,,	21 ,, 15 ,,	14⅛ ,,	1 3 0
13459	17 ,,	21½ ,, 18½ ,,	15 ,,	1 3 0
14284	18 ,,	18 ,, 13½ ,,	19 ,,	1 5 0
12990	18 ,,	18 ,, 15 ,,	15 or 19 ,,	1 5 0
7135	18 ,,	19⅜ ,, 15 ,,	13 ,,	1 5 0
10221	18 ,,	19 ,, 16 ,,	19⅜ ,,	1 5 0
4506	18 ,,	20 ,, 13 ,,	19½ ,,	1 5 0
6470	18 ,,	20 ,, 13 ,,	15 ,,	1 5 0
6818	18 ,,	20 ,, 18½ ,,	17⅞ ,,	1 5 0
13998	18 ,,	20 ,, 14 ,,	19½ ,,	1 5 0
4083	18 ,,	20 ,, 15 ,,	16 ,,	1 5 0
5306	18 ,,	20½ ,, 14 ,,	18¾ ,,	1 5 0
13295	18 ,,	20½ ,, 14 ,,	19½ ,,	1 5 0
7356	18 ,,	20½ ,, 18½ ,,	13 ,,	1 5 0
4569	18 ,,	21 ,, 14 ,,	18 ,,	1 5 0
3628	18 ,,	21 ,, 15 ,,	16 ,,	1 5 0
13999	18 ,,	22 ,, 14 ,,	19½ ,,	1 5 0
7640	18 ,,	22 ,, 12½ ,,	13½ ,,	1 5 0
14250	19 ,,	19 ,, 14 ,,	19 ,,	1 8 6
14286	19 ,,	20 ,, 13½ ,,	20 ,,	1 8 6
7971A	20 ,,	20 ,, 15 ,,	18 ,,	1 11 0
14285	20 ,,	21 ,, 13½ ,,	19 ,,	1 11 0

Mouthpieces with Circular Lids for Oval Retorts.

Pattern No.	Diam. Mouth.	Internal Dimensions of Retort.	Length of Mouthpiece.	Lid and Fittings without Mouthpiece.
13658	14 ins.	14 × 12 ins.	15 ins.	£0 19 0
4356	14 ,,	18½ ,, 12 ,,	12½ ,,	0 19 0
6851	15 ,,	16 ,, 14 ,,	13 ,,	1 0 0
3629	15 ,,	18½ ,, 13½ ,,	14 ,,	1 0 0
3580	15 ,,	21 ,, 15 ,,	15 ,,	1 0 0
6264	16 ,,	18½ ,, 15½ ,,	15½ ,,	1 1 0
5210	16 ,,	20 ,, 14 ,,	15 ,,	1 1 0
6263	16 ,,	24 ,, 16 ,,	18½ ,,	1 1 0
5370	17 ,,	20 ,, 14 ,,	14 ,,	1 3 0
6832	17 ,,	20 ,, 14 ,,	17 ,,	1 3 0
6183	17 ,,	20 ,, 15 ,,	15 ,,	1 3 0
4289	17 ,,	21 ,, 15 ,,	14 ,,	1 3 0
5270	17 ,,	22 ,, 14 ,,	14 ,,	1 3 0
3631	18 ,,	18 ,, 14 ,,	20 ,,	1 5 0
3681	18 ,,	21 ,, 14 ,,	13½ or 15 ,,	1 5 0
3554	18 ,,	21 ,, 15 ,,	14½ ,,	1 5 0
7957	18 ,,	22 ,, 16 ,,	14 ,,	1 5 0
8048A	19 ,,	25½ ,, 15 ,,	18 ,,	1 8 6

Mouthpieces with Oval Lids for Oval Retorts.

Pattern No.	Dimensions of Mouth.	Internal Dimensions of Retort.	Length of Mouthpiece.	Lid and Fittings without Mouthpiece.
9800	18 × 14⅞ ins.	18 × 14⅞ ins.	15 ins.	£1 5 0
9205	20 ,, 12 ,,	24 ,, 14 ,,	10½ ,,	1 10 0
10000	20½ ,, 14½ ,,	20½ ,, 14½ ,,	16 ,,	1 10 0
9680	21 ,, 15 ,,	21 ,, 15 ,,	15 ,,	1 12 0
10056	21 ,, 14½ ,,	21 ,, 14½ ,,	15⅜ ,,	1 12 0
13218	21 ,, 15 ,,	21 ,, 15 ,,	17 ,,	1 12 0
10514	22½ ,, 13⅜ ,,	22½ ,, 13⅜ ,,	13⅜ ,,	1 13 0
13766	20 ,, 17 ,,	20 ,, 17 ,,	15½ ,,	1 15 0
13269	24 ,, 15 ,,	24 ,, 15 ,,	16 ,,	1 18 0
13884	24 ,, 15 ,,	24 ,, 15 ,,	10 ,,	1 18 0

Mouthpieces with D Lids for D Retorts.

Pattern No.	Dimensions of Mouth.	Internal Dimension of Retort.	Length of Mouthpiece.	Lid and Fittings without Mouthpiece.
12292	15½ × 13 ins.	15½ × 13 ins.	12 ins.	£1 2 0
9967	16 ,, 14 ,,	16 ,, 14 ,,	15½ ,,	1 3 0
13574	16⅜ ,, 13⅜ ,,	16⅜ ,, 13⅜ ,,	12½ ,,	1 4 0
9899	18 ,, 12 ,,	18 ,, 12 ,,	14 ,,	1 4 0
12980	16 ,, 16 ,,	16 ,, 16 ,,	18 ,,	1 6 0
13900	18 ,, 13⅜ ,,	18 ,, 13 ,,	15 ,,	1 6 0
9912	18 ,, 13½ ,,	18 ,, 12½ ,,	17 ,,	1 6 0
9962	18 ,, 13½ ,,	18 ,, 13½ ,,	16 ,,	1 6 0
10982	18 ,, 18½ ,,	18 ,, 14 ,,	15 ,,	1 6 0
11098	18 ,, 14 ,,	18 ,, 14 ,,	12 ,,	1 6 0
9492	20 ,, 13 ,,	20 ,, 13 ,,	15 ,,	1 10 0
9208	20 ,, 13 ,,	20 ,, 13 ,,	19½ ,,	1 10 0
10251	20 ,, 13 ,,	20 ,, 13 ,,	15½ ,,	1 10 0
12964	20 ,, 13 ,,	20 ,, 13 ,,	18½ ,,	1 10 0
9909	20 ,, 13⅜ ,,	20 ,, 13⅜ ,,	17 ,,	1 10 0
12969	19½ ,, 15½ ,,	19½ ,, 15½ ,,	14 ,,	1 11 0
13781	20 ,, 15 ,, Front. 21 ,, 15 ,, Back.	21 ,, 15 ,,	15 ,,	1 11 0
14287	20½ ,, 14⅞ ,,	20½ ,, 4⅞ ,,	17 ,,	1 11 0
7692	21 ,, 15½ ,,	21 ,, 15½ ,,	16 ,,	1 11 0
12978	20 ,, 16 ,,	20 ,, 16 ,,	17 ,,	1 11 0
13252	20 ,, 16 ,,	20 ,, 16 ,,	18 ,,	1 11 0
13220	21 ,, 15 ,,	21 ,, 15 ,,	17 ,,	1 11 0
13992	21 ,, 16 ,,	21 ,, 16 ,,	17 ,,	1 11 0
8977	21½ ,, 13⅜ ,,	21½ ,, 13⅜ ,,	18⅜ ,,	1 12 0
8976	21½ ,, 13⅜ ,,	21½ ,, 13⅜ ,,	19½ ,,	1 12 0
10497	21½ ,, 13⅜ ,,	21 ,, 13½ ,,	18½ ,,	1 12 0
8037	21½ ,, 13⅜ ,,	21½ ,, 13⅜ ,,	18½ ,,	1 12 0
9908	21½ ,, 13⅜ ,,	21½ ,, 13½ ,,	15 ,,	1 12 0
10404	21½ ,, 13⅜ ,,	22 ,, 14 ,,	18½ ,,	1 12 0
12410	21½ ,, 13⅜ ,,	22 ,, 14 ,,	12 ,,	1 12 0
13822	21½ ,, 13⅜ ,,	22 ,, 14 ,,	15 ,,	1 12 0
10515	22½ ,, 12⅜ ,,	22½ ,, 12⅜ ,,	13½ ,,	1 12 0
7924	24 ,, 14 ,,	24 ,, 14 ,,	15⅜ ,,	1 13 0
13807	24 ,, 15½ ,,	24 ,, 15½ ,,	16 ,,	1 14 0
9015B	25 ,, 14 ,,	25 ,, 14 ,,	13½ ,,	1 14 0
10932	25 ,, 14 ,,	24 ,, 14 ,,	13½ ,,	1 15 0
12944B	22 ,, 16 ,,	22 ,, 16 ,,	16 ,,	1 15 0
14037	22 ,, 16 ,,	2 ,, 16 ,,	18 ,,	1 15 0
14119	22 ,, 16 ,,	22 ,, 16 ,,	18 ,,	1 15 0

Patterns marked A have Sockets at back to connect to Retorts; all the others are flanged. Patterns marked B have curved bottoms.

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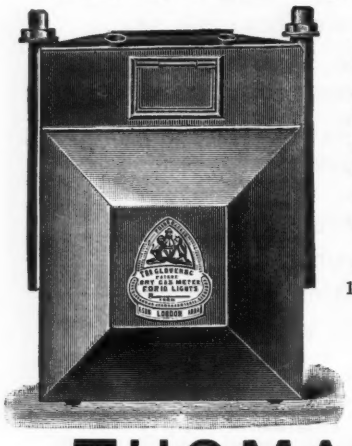

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THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, MARCH 22, 1892.

Municipalism.

THE striking circumstance of the ratepayers of London having returned for their County Council a body of whom the majority are known to be in favour of "municipalizing" all kinds of public services hitherto rendered by trading companies, is a sign of the times that has its teaching not only for Londoners, but also for townspeople and ratepayers all over the kingdom. For it is very obvious that this idea of the so-called municipalization of public services must be referred, for its origin and support, to the examples of some great cities and towns of England and Scotland. If the new London County Council aim at controlling the water supply, the police, the gas supply, the tramways, the docks, and similar necessaries of Metropolitan life, it is only because the same thing is actually done in different parts of the country, and because in all probability these enterprises have, in the case of London, been left to private initiative through the absence of any municipal organization for the whole Metropolis, which might otherwise have taken them in hand. The sweeping victory of the self-styled "Progressive party"—the party of municipalization and of many other ideas—over their so-called "Moderate" opponents at the recent County Council polls, may be explained in a variety of ways; but there is one explanation of the result which, whether or not it is sufficient to account for everything, is certainly good so far as it goes. It is simply this: The Progressives had a programme, such as it was, and their opponents had none. It has thus been demonstrated once more that a policy of simple negation—of keeping things as they are, and pretending that everything is all right as it is—will not do to fight an election upon. In the estimation of the poor and less comfortable majority, to whom political power has been committed, there is a great deal in modern town life which is anything but right. The voice of London in this regard is very likely to be the voice of Glasgow, Manchester, Liverpool, and Birmingham when the same issue is raised. The party that promises to do something to improve the common lot is certain to gain more votes than the party which has no ideals. Your Progressive may not be certain of being able to create a new heaven and a new earth out of the old materials. But, at any rate, he is ready to promise to "have a good try;" and this is the policy that catches the multitude.

It may be admitted at once that the highly-important question of municipalizing the Metropolitan Gas Supply hardly entered as a practical issue into the recent County Council elections. Yet it cannot be denied that the party which won at these elections is the party that has deliberately inscribed the acquisition of the gas undertakings in its "program"—not to be taken in hand just yet, but not to be lost sight of. There is not the slightest doubt that those municipal politicians who think at all to the purpose respecting this subject. are quite willing to allow the Gas Companies and the Electric Light Companies to fight it out between themselves for a few years, until it is made manifest to what extent they are able to interfere with, or to help each other. The latter are safe for their 42 years; and by that time much may happen to the Gas Companies, who are meanwhile kept up to the mark by the sliding scale. We are, however, concerned to point out that, after a few constitutional preliminaries are settled, the question of the gas supply may at any moment be forced to the front by unforeseen influences. Let any one or more of the London Gas Companies come to grief, or be plunged into serious trouble from any cause arising from within—such as mismanagement of sufficient importance to discredit the existing settlement—and it would speedily appear that London has at last a local authority strong enough to take a hand in the future control of the gas supply.

The London County Council has, of course, much to do before it can approach the gas question in the regular way. The continued existence of the City Corporation as an independent organization has to be considered; and the same remark applies to the *status* of the Vestries, which, so long as they discharge their present functions, will effectually prevent the County Council from attaining to the powerful position from which it can alone expect to successfully attack the larger items of its ambitious "program." Whether or not the County Council is to itself absorb all the other Metropolitan local governing bodies, or is to act the fashionable part of a "pioneer" organization for the establishment of a new London Corporation, remains to be seen. Most of the light and airy critics who argue that the County Council ought to become a Parliament for London, and who prattle, in the political jargon of the day, about the desirability of "Metropolitan "Home Rule," forget that a County Council is not even a Municipality. It may or may not be found necessary to consolidate the various local governing bodies having concurrent powers in London; but for the time being, at any rate, these are distinct.

It is absolutely impossible to ignore the growth of the feeling which inspires modern self-governing communities in favour of doing as much as possible for themselves, and dispensing with the once universal "farmer," or contractor.

We have ourselves argued for the elimination of the contractor, or middleman, from the conduct of gas supply; and it is not for us to dispute the view that a statutory gas company is actually a species of contractor to the community which it supplies, enjoying a certain sanction upon the tacit understanding that it is able to serve the public better than could be done by the public themselves through their representatives. Time was, as we know, when public bodies did very little for themselves beyond endeavouring to keep the peace. As the possibilities of the device of raising loans for capital purposes upon mortgage of the rates became explored, and the municipal spirit grew more commercial than warlike, so the work of the town was taken in hand more and more by the town's representatives, until it has come about that the manifold responsibilities (say) of the Lord Provost of Glasgow have stretched year by year to embrace matters that would have appeared foreign indeed to Bailie Nicol Jarvie. We name Glasgow merely because it is one of the most highly-developed of modern municipalities; but like observations may be applied to other British towns.

Having accepted the proposition that municipalism is capable of extension upon the Glasgow model, and more—for even Glasgow is not quite perfect—we must be allowed to hold that the degree in which the proposition shall be applied in any particular case is wholly a question of expediency. When a municipality proposes to acquire, or to create, any undertaking for supplying the community which it represents with a necessary of civic life, the first thing to be done is to prove the expediency of the scheme to the satisfaction of Parliament. And it should be the same with the first and ultimate tribunal known as Public Opinion. There ought to be no attempt on the part of leaders in politics or in philosophy to prejudice the question of expediency by asserting a general principle which takes insufficient account of experience. Yet this is constantly done, not only by the smatterers who presume to draw up "London programs," but even by really great thinkers like Mr. W. S. Lilly. In his latest book "On "Shibboleths"—which, by the way, everybody who does not desire to be led away by the claptrap of the day should read—this author declares that "the monopolies "enjoyed by railway and water companies—to give only "two examples—are utterly wrong in principle. Such "great public works ought to be owned by public authori-"ties, and to be administered for the public benefit, not "for private profit." He also quotes from Mill a denunciation of the granting of "practical monopolies" to private companies.

It is an interesting example of the difficulty of practising what one preaches, that Mr. Lilly, who in all his works is most careful to teach the purely ethical signification of the word "ought"—which he says is a word that can never arise out of materialistic or necessitarian considerations—falls here into the error of using this transcendental term in regard to what is, after all, a question of expediency. The world wants railways, towns want water and gas, tramways, and many other services. The only question is, as we take it, how these wants can be best supplied. There is no question of principle in the matter; but different expedients may be adopted, which we can judge by their results. If the State, or the Municipality, can serve the community better than a private undertaker or a semi-public company, let them do it; but let us be quite sure that this result will follow before we take the irrevocable step of extinguishing private initiative. Mr. G. Livesey put the matter upon its proper basis when, at the recent meeting of the South Metropolitan Gas Company, he had to answer a question as to what would be the position of the shareholders in the event of a proposal from the County Council to buy the gas undertakings. Mr. Livesey said: "The first thing was to show that the public would be "better served by the Company than by the Council." There is the whole thing in a nutshell. Again, how is the imaginary "principle" that railways "ought" to be owned by public authorities affected by the notorious fact that the British public are, on the whole, vastly better served by the "monopolist" Companies than are the inhabitants of European countries where the railways are supposed to be "administered for the public benefit?" Surely, the right solution of all such questions as the nationalization or municipalization of supply or transit undertakings must be governed by considerations of "how "things work"—which is as much as to say that they are questions of expediency, and not, in the true sense, of principle. But this will be enough upon the subject for the present issue of the JOURNAL.

Sir F. Mappin Replies to Colonel Makins.

THE Sheffield United Gaslight Company have held their ordinary general meeting, under the presidency of Sir Frederick T. Mappin, Bart., M.P., when the report and statement of accounts, summarized in our issue for the 1st inst., were presented and adopted. The usual maximum dividend was declared; and although to pay it involved the necessity of taking £5546 from the undivided balance, the prospects of the Company are considered to be distinctly brightening. It is no reflection upon the intrinsic importance of the Sheffield undertaking, however, which must always rank with the foremost Gas Companies of the kingdom, if we state that the most generally interesting portion of the Chairman's address will be taken, by readers of the JOURNAL, to be the passages in which Sir F. Mappin explained the reasons for his appearances at the meetings of The Gaslight and Coke Company as a critic of the Horseferry Road administration. Among other things, it appears that the condition of the trade in gas-works residuals, and especially of the sulphate of ammonia market, is a sore point with the management of the Sheffield Company, as it has long been with those who are responsible for the commercial success of other Gas Companies. Consequently, Sir F. Mappin felt impelled to address publicly to Colonel Makins, M.P., in his capacity of Governor of The Gaslight and Coke Company, the pointed inquiry, which has now become historical, as to whether the Chartered sulphate is sold through one broker who also buys for himself. To this query Colonel Makins returned a distinct, categorical negative, which, of course, Sir F. Mappin could not do otherwise than accept. The Chartered Governor also "scored" against his interlocutor by claiming that the practice of his Company compared "most favourably" with that of the Sheffield Company. Sir F. Mappin was obliged to sit patiently under all this; but he has now returned to the charge, and, as the report shows, has convicted Colonel Makins of having made statements which are not in accordance with the facts. Nobody will suspect the Governor of the Chartered Company of wilful misrepresentation; but it is clear that he must have been singularly ill-advised in making the assertions he did, and for which he will be under the painful necessity of apologizing at the next Horseferry Road meeting. Sir F. Mappin's comments on this happily uncommon incident are few and forbearing; and we shall not add to them beyond expressing our satisfaction that the Sheffield Chairman has been able to meet so fully the demand for a justification of his action at the Chartered meeting which we made in our issue for the 16th ult. The *parole* now lies with Colonel Makins, who has to explain how he came to deny, in public meeting on the 5th, those assertions which have since been so easily proved to be true. The Governor of The Gaslight and Coke Company can hardly rest content under the suspicion that his future official utterances, whenever they tend to the exculpation of the Horseferry Road administration, will require to be taken *cum grano salis*.

The Play of the Miners, and a Cry of Gas Directors.

THE great coal "boom" has spent itself. This is, to all intents and purposes, the result of last week's transactions in coal. The miners under the orders of the Federation proceeded to "play" in the orthodox way, and their leaders met in solemn conclave in London on Wednesday, ostensibly to decide whether work should be resumed after a week or a fortnight's suspension of production. It was agreed that the "play" should only last for a week; but that after the 11th prox. there should be no mining on Mondays. The huge joke of the proceedings at this conference, however, was the unanimous declaration that the object of the movement had been satisfactorily attained. Naturally, all the newspapers were asking next day for the evidences of success upon which such a statement was based. To the ordinary man who does not view everything through Trade Union spectacles, the only people who have made anything out of the job are the middlemen, and to some extent the coal-owners. The men have sacrificed a week's pay, which can never be recovered, and simultaneously with the resumption of work by the deluded "players," the inflated prices of

coal gave way everywhere; and it is certain that, so far from preventing a reduction of wages, the blunder of the Union leaders has hurried it forward. It is to be supposed, however, that the declaration of the Westminster Conference means no more than the reluctance of those who are responsible for it to confess that they have made egregious fools of themselves and of their supporters. We further notice that attempts are also being made, in quarters which uphold the modern dogma about the infallibility of Trade Unions, to blame the royalty-owners, and indeed everybody else but the men, for the disastrous results of the Federation *fiasco*. The pretence is too thin, however, and it may be taken as pretty certain that the true state of the case is sufficiently well understood by those most nearly concerned to render a repetition of the performance extremely improbable. Meanwhile, we have to notice a very extraordinary proceeding on the part of the management of the Commercial Gas Company. Mr. H. E. Jones, the Engineer and General Manager of the Company, issued to the consumers a notification stating that, in consequence of the strike of the Durham miners, coming shortly after an eight days' strike of coal porters, it would be necessary "to carefully husband "the present resources of the Company." The Directors accordingly begged the consumers to dispense with "extra "lights and consumption until the termination of the "strike." This remarkable notice—unique in the history of the gas supply of London—concludes with what was evidently intended to be a clever bid for coke orders from users of gas-stoves, who are promised a special discount of 10 per cent. The wisdom of issuing any such confession of weakness by the Directors of a wealthy Gas Company may be a debateable matter. We do not hesitate to characterize it as a peculiarly futile and uncalled-for proceeding. Is it not a plea to the public to use anything rather than gas, and an admission that the Directors cannot deal with the ordinary risks of their own business? If the Company's "coalies" are impracticable, why does not Mr. Jones employ others? and if he cannot get coal from Durham, is there no other field open to him? and, in any case, would it not have been as well to wait until the Company had been hurt before crying out? When the issue of this cry for mercy was first bruited abroad, we could hardly believe it possible that gas directors had been brought so low. It is something to be thankful for that all gas administrators are not of their complexion. The incident is greatly to be deplored, especially as there was a prevalent impression that the management of the Commercial Company was of decidedly respectable quality. It may still be argued that the Directors and their General Manager have shown prudence in what they have done; but it can hardly be claimed that they have manifested any pluck.

Common Law versus Local Laws.

It may appear at first sight a strange topic to find mentioned in these columns; but we really cannot help drawing attention to the remarkable performance of the House of Commons recently, in deciding that a particular clause of the Improvement Act under which the town of Eastbourne is governed should be reconsidered, upon the ground that it is against the general tenor of the law of the land. It is nothing to the purpose that in this particular case a religious grievance was the medium through which honourable members saw the heinousness of the Eastbourne Improvement Act. The wonderful thing is that upon this occasion the most "advanced" politicians in Parliament were actually in the same boat with Lord Wemyss and his fellows of the Liberty and Property Defence League, whose yearly care it is to protest against the inconsistencies and irregularities of municipal statutes. It has long been notorious to all who have occasion to follow municipal legislation, that the local authorities of the United Kingdom have a strong tendency to vary the common law in all sorts of strange respects to suit their own fancy. It is not many years ago that a new Standing Committee of the House of Commons was appointed to have cognizance of the police and sanitary regulations of local statutes, in order that some system might be introduced into these enactments. But the mischief and inconvenience to the Queen's subjects traceable to the fussiness of local governing bodies, are no joke; and if the experience of the Salvation Army at Eastbourne does no more than call attention to the height already attained by grandmotherly legislation in some places, and put a stop to fresh developments of the same objectionable growth, the serio-comic martyrdom of these indomitable tambourine-beaters will not have been altogether wasted. The subject of town regulations is not an easy one. It is impossible to legislate for all places alike, for it is obvious that proceedings which would not hurt Salford might be unbearable at Cheltenham. It may or may not be pardonable for people to treat the Medlock as they do; but nothing of the kind could be permitted in the case of the Thames. At the same time, there is reason in all things; and it cannot be proper for a respectable tradesman, by merely moving from one town into another very like it, to incur all sorts of pains and penalties for performing some acts, or for neglecting to do others, which would nowhere else bring him under the notice of the police. We are an illogical people, and do not legislate by rule. It is as much as we can flatter ourselves upon, if we have a few intelligible general principles in legislation which can be pleaded before a Committee. If we were fonder of rules in these matters, we should perhaps have a set of constitutions drafted, to which reference could be made when any municipality wanted an Improvement Act, and which would show at once what is permissible in this way for a manufacturing, for a market, for a seaport, or for a fashionable residential town, as the case might be. As it is, we go to work in the most hap-hazard style. If an energetic Town Clerk hears of a regulation from any quarter which he thinks would suit his town, he makes a note of it; and when his next "Omnibus Bill" is drafted, these scraps of administrative experience are quietly stowed away in it, to become law in due season. Sometimes, but rarely, attempts to apply these powers cause trouble, like that at Eastbourne; and somebody is moved to play Hampden to the petty local Star Chamber, until one side or the other gives in. This is very undesirable, of course; but the difficulty is to know what is to be done. If Parliament is to revise every Corporation Act which contains peculiar provisions, where is it to begin, and where stop? We shall close this paragraph, however, by repeating our expression of the amused surprise which an impartial observer may be supposed to feel on seeing Social Democrats and stern Individualists in agreement in respect of the undesirability of allowing municipalities to override, by their own statutes, the general law of the land.

Mr. T. S. Cleminshaw, Assoc. M. Inst. C. E., Engineer of the Launceston (Tasmania) Gas Company, has lately received an addition of £50 a year to his salary, as a testimony of the Directors' appreciation of his services on behalf of the undertaking. This is the second increase in the nine years Mr. Cleminshaw has filled his present position.

The Installation of Inclined Retorts at Brentford.—We learn that several of the Directors of The Gaslight and Coke Company and other influential engineers, on the 17th inst., visited the installation of 112 inclined retorts which have been erected by Mr. Frank Morris at the Brentford works of the Brentford Gas Company; and, after a close examination of their working and results, they were much impressed with the great advantages of this method of stoking.

Presentation to Mr. W. Slack.—On Friday, the 11th inst., an interesting presentation by the employees at the Bowness Gas-Works took place, on the eve of Mr. William Slack's departure from the district. It consisted of a purse of gold and a gold albert, with a gold brooch for Mrs. Slack. Mr. Slack has been an old servant of the Bowness Gas Company, having entered their service as collector in 1877; and during the past 15 years, he has won the esteem of the inhabitants of both Bowness and Windermere by his civility and kindly good nature while acting in that capacity. The Manager of the works (Mr. John Duxbury) made the presentation; and, in a few appropriate remarks, he referred to the pleasant relations which had always existed between the men and Mr. Slack, and expressed the hope that the same feeling might be shown to the new collector and himself.

Gas v. Electricity for Heating Purposes.—Early in the present year, some figures relating to the relative expense of heating by electric current and by gas were given in the *Electrician*. The Editors of that publication have since examined the simple case of boiling a pint of water, but have neglected the losses, which may be very small, since the heat may be produced exactly at the point required. To boil a pint of water, starting from 20°C., takes about 45,000 calories; and to do this in five minutes, an expenditure of 625 watts, costing 0·42d. (at 8d. per unit), will be required. It must, however, be admitted that half a cubic foot of gas, costing 0·018d. (at 3s. per 1000 cubic feet), will do the same work. The specific heat of a mutton chop is not given in the text-books; it is probably not much above 0·5. But radiant heat is necessary; and the calculation of the energy required would, our contemporary says, be rather difficult.

WATER AND SANITARY AFFAIRS.

As announced in our columns last week, the names of the members constituting the Royal Commission relative to the Metropolitan Water Supply have been made known, together with the terms of the reference; the latter being in verbal accordance with the communication addressed to Sir John Lubbock by Mr. Ritchie in January last, and published in the JOURNAL at the time. Lord Balfour of Burleigh, as Chairman of the Commission, appears to be a good appointment; and the others are able men, though, when we consider the relation of Mr. J. Mansergh to the Birmingham scheme, we are a little surprised to find him on the Commission. We may take it, however, that this gentleman's appointment signifies that the Commission will have nothing to do with getting a supply for London from Mid-Wales. It seems now to be understood that the inquiry by the Commission is to be kept within the limits of the Thames Valley. *The Times* expresses dissatisfaction with this restriction of the inquiry, but considers there is nothing to prevent the scope of the reference being enlarged later on. The *Daily Chronicle*, as the organ of the County Council, takes a different view, and looks at once to the Royal Commission for "an "authoritative opinion on the best sources of an alterna- "tive supply," which is to have the happy effect of "bring- "ing the Water Companies to reason." On the part of the Press generally, we observe a hasty conception that the result of the coming inquiry is "a foregone conclusion," to the effect that the present sources of water supply for London and its environs are inadequate "in quantity and "quality." If the inquiry is carried on hurriedly, and without sufficient care, such a conclusion may be arrived at; but the actual facts may be otherwise. The action of the Water Companies for the present consists in the formation of a Joint Committee, composed of the Chairmen of those Companies which depend mainly on a supply from the Thames or the Lea; this Committee being authorized to procure scientific and other evidence in proof of the quality and sufficiency of the supply to be obtained in the watersheds connected with these rivers. The death of Dr. Meymott Tidy at the present crisis is a matter of special regret, in addition to the fact that this eminent analytical chemist has been cut off at a comparatively early age.

"An Explanation of the London Water Question" was lately offered to the members of the Surveyors' Institution, in a paper read before that body by Mr. J. W. Grover—an Engineer well known in connection with the Rickmansworth and Leatherhead Water Companies. Mr. Grover's theory is that, at the present rate of increase, Greater London will by the year 1901 probably contain nearly 7 million persons, and will need to have its supply of water enlarged by 45 million gallons per day. Our attention is directed to the Leatherhead and Mole district, at the base of the Box Hill chalk ranges, and the Rickmansworth or Colne district, at the base of the great chalk Chiltern range. Here, it is intimated, the auxiliary supply is to be obtained. This may be true; and we hope it is so. But there follows the extraordinary statement that "both these districts have been assigned to "Water Companies under parliamentary authority; and, "in view of the coming wants of London, permission has "been granted to them to deal with the surplus water." Mr. Grover continues his argument by saying: "So "that, practically, during the last ten years, in the three "Acts of Parliament which incorporate these Companies, "the supplemental supply for coming London has been "legislated for." We venture to say that Parliament had not the slightest idea of placing the key of the situation in the hands of the Leatherhead and Rickmansworth Water Companies. Further on in his paper, Mr. Grover repeats his assertion that authority has been given to these Companies to "dispose of surplus water;" the effect being, as he puts it, that "no fresh legislation is required, "except such as may be needed for London itself, "to enable it to form the Trust and take the water." We fail to see what benefit London derives in having to take the water through the medium of two local Companies, instead of going direct to the Box Hill and Chiltern ranges. London, by a newly-created Trust, or by the existing Metropolitan Companies, would be well able to take care of itself; and these local powers simply come in to levy toll. If these two Companies have a prior claim to all the water in the districts of the Mole and the Colne, how is it that Mr. George Webster is able to offer 20 million gallons per day from the Colne Valley for the use of London? Mr. Webster has already put up machinery wherewith he can pump 10 million gallons per day. But where are the two Companies in that case, with all their parliamentary powers and privileges? In another part of his paper, Mr. Grover says: "The site of the pumping-station of the Rickmansworth "and Uxbridge Valley Water Company is very remark- "able, and is worth special attention, as it is this Com- "pany's district from which the great immediate supple- "mental supply of London must be taken, under the "powers of the Act of Parliament." The word "imme- "diate" appears to mean that the first part of the supplemental supply is to come from the Rickmansworth district; and we may presume that this is intended to cover the operations of Mr. G. Webster. The general drift of the argument appears to be that, if the London Water Companies, or the authorities represented by some newly-formed Trust, ever come to the neighbourhood of Rickmansworth or Leatherhead in search of water, they must buy of somebody, whether it be of the two existing Water Companies or of Mr. Webster. We commend this monopoly of natural sources to the notice of Sir W. Harcourt, who must assuredly be scandalized at the idea.

It is amusing to find that while Mr. Grover stoutly defends what he conceives to be the exclusive rights of the two suburban Water Companies with which he happens to be more directly identified, he distinctly disputes the existence of such rights in the case of the Metropolitan Companies. Speaking of these bodies, he says: "The "Companies have, I believe, no monopoly; they have "only a permission. Anybody can dig a well and supply "himself and his neighbour." Certainly, anybody can do so at his own costs and charges; but he has no power to lay mains in the streets and sell the supply. The Commissioners of Sewers know this, and restrain their operations accordingly. They are aware that they cannot even open the streets to lay mains from their artesian well in Stoney Lane to the Mansion House. Mr. Grover clearly underrates both the privileges and the powers of the London Water Companies, while he exalts those of his friends. But while we must decidedly demur to many of Mr. Grover's statements, we feel that he is doing good service in showing the extent to which water abounds in the underground strata around London. He quotes Sir Robert Rawlinson's statement, given in evidence during the Corporation inquiry, that in the Valley of the Thames "there is an abundance of water outside the open rivers." But beyond all this, there is the consideration put forth by Mr. E. H. Stevenson and Mr. E. K. Burstal, in their recent pamphlet on this subject, that the present water supply at the disposal of the Metropolitan Companies, if economized in a reasonable manner, and after the example of several large provincial towns, would suffice for a population of more than 10 millions. The only question is, as put by the two gentlemen just named, whether it may be wise, in view of a possible contingency, to obtain the control of a remote watershed, seeing that the large towns are slowly, but surely, appropriating the few remaining available areas. But at the same time it is submitted that the question is not one of urgency.

Death of Mr. J. Davies, of South Brisbane.—We regret to record the death of Mr. John Davies, the first Engineer and Manager of the South Brisbane Gas Company, Limited, and under whose superintendence the works were erected. He was formerly Engineer of the Kidsgrove and Oswestry Gas Companies; and was probably known to some of our readers. He has been succeeded at South Brisbane by his son, Mr. G. A. Davies, who assisted his father during the construction of the works, and subsequently became Manager to the Townsville Gas Company.

The Coal Resources of Belgium.—As bearing on the vital question of the exhaustion of the coal resources of Belgium, it is stated, says *Engineering*, that, while the average depth of the French coal mines is 1056 feet, in Hainaut it is 1773 feet; that in the Mons basin there is a pit now being worked of 2988 feet in depth, and another unworked pit in the same district of 3801 feet; while in April last it was reported that in a Borinage pit, known as Sainte Henriette des Produits, at Flénu, a rich seam of coal had been discovered at the extraordinary depth of 4120 feet. These figures tend to show that Belgium is rapidly exhausting the "cream" of her coal resources—that is, coal found within 2000 feet of the surface.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 550.)

ALTHOUGH it cannot be said that business in the Stock Exchange developed much more activity during the past week, yet the tendency of the markets was distinctly favourable. To this the chief contributing influences were the continuing and assured cheapness of money, the brighter weather, the termination of the coal difficulty, the relief proceeding from the Murrieta business having come to a definite and intelligible position, and the hopeful tone of Mr. Lidderdale's utterance regarding the Baring imbroglio. Too much expectation should not be founded upon the last two items; but the rest are sound facts. As to money, the Bank rate may hold on till the end of the month; but it seems bound to go down at the first meeting in April. The Gas Market has been quite active—conspicuously so when compared with business of late. The Metropolitan Companies furnished the greater part of the transactions recorded. Gaslight "A" was much dealt in. It opened unchanged, but fell away later on; and business was marked at 210½, with a drop of 1 in the quotation. The next day was similar. Then came the turn; prices mended and the quotation was restored. On Friday, it rose 1 higher; and the last mark at the close was 215½—the best of the week. The termination of the miners' "play" had probably something to do with this. The adjustment of that difficulty, however, still leaves the Durham strike unaffected. Gaslight debentures were freely dealt in at firm figures; and the same in a less degree can be said of the preferences. South Metropolitans were fairly active, and were firm and unchanged. A few bargains in Commercial new were marked at about the same price. Not a single transaction was recorded in Suburbans or Provincials; and all quotations were left unvaried. Continentals were rather quieter; but the tendency was good, and Imperial recovered the point it had lost the week before. Among the rest, Bombay were firm; and the fair things promised in connection with Argentine affairs put Buenos Ayres shares another ½ up. Water stocks have been knocked down freely—a deal too freely, we should say—and quotations are almost nominal. But, as long as proprietors will keep their heads and sit tight on their stocks, no harm will be done.

The daily operations were: Business in Gas on Monday was moderate; and the bulk of it was in Gaslight "A," which fell 1. Other prices were steady. In Water, East London fell 5½; Chelsea, 5; Southwark, 2½; and Grand Junction, Lambeth, and West Middlesex, 2 each. Tuesday's business in Gas was about the same; and prices were unchanged, except for a rise of ½ in Buenos Ayres. In Water, Kent fell 5; West Middlesex, 2½; and Lambeth, 2. Gas was better on Wednesday, and all prices were very favourable; Gaslight "A" and Imperial Continental advancing 1 each. Grand Junction Water was 2 lower. Thursday was an active day in the Gas Market; and prices held very firm. The fall in Water was continued by Chelsea receding 5; Lambeth, 2; and Grand Junction, 1. Activity and firmness were still the feature of the Gas Market on Friday; and Gaslight "A" rose 1 more. Water was unchanged. Saturday was quiet, as usual; but prices marked in Gas were very good. All Gas and Water quotations remained unchanged, except that New River debentures rose 1.

CHARLES MEYMOTT TIDY.

WE record, with much regret, the death on Tuesday last, in his 50th year, of Dr. Charles Meymott Tidy, the eminent analytical chemist. He had last year an attack of influenza, which, as is usually the case, left him with impaired strength; and he never thoroughly regained his habitual capacity for work. Dr. Tidy was a son of the late William Callender Tidy, M.D., of Hackney; and for a short time he continued his father's practice. He possessed qualifications which specially fitted him for the profession of which he was so distinguished a member; and with such earnestness did he devote himself to his studies, that he was already a member of the Royal College of Surgeons when, in 1866, he took his M.B. degree, with the highest honours, at the University of Aberdeen. Coming to London, he became associated with the late Dr. Letheby, at the London Hospital. On the death of that able chemist, Dr. Tidy succeeded him as Professor of Chemistry, Medical Jurisprudence, and Public Health in the Medical School at that Institution, and also as Medical Officer of Health for the City of London. The former appointment he held till his death. He was Official Analyst to the Home Office, Medical Officer of Health for Islington, and a Licentiate of the Society of Apothecaries. His studies were not confined to medicine only, but extended into the domain of jurisprudence. The result was that a few years ago he was called to the Bar at Lincoln's Inn; and he held the office of Reader of Medical Jurisprudence to the Inns of Court. He was a member of the Society of Arts, and delivered a course of Cantor Lectures on "The Practical Application of Optics to the Arts and Manufactures and to Medicine," in November and December, 1873; and in April 1886, he read his elaborate paper on "The Treatment of Sewage," which was discussed at three adjourned meetings. In 1889, the Swiney Prize was awarded to him for his work entitled "Legal Medicine." His principal works are his "Handbook of Modern Chemistry," published in 1878; his "Handy Book of Forensic Medicine and Toxicology," brought out in 1877 in conjunction with Mr. W. B. Woodman; and his "Legal Medicine," issued in 1883.

As an authority on chemistry and toxicology, Dr. Tidy unquestionably occupied a high position; and on water supply and sanitary matters his opinion was greatly valued. As our readers are aware, he, in conjunction with Mr. W. Crookes, F.R.S., and Dr. W. Odling, conducted daily examinations, on behalf of the London Water Companies, of the water supplied by them to the Metropolis; the monthly reports thereon to the Official Water Examiner (which we believe were prepared by him) having always been reproduced in our columns. Among the engagements he held at the time of his removal was one with the Barrow-in-Furness Corporation, who had consulted him as to the quality of certain new sources of water supply, for the acquisition of which they are now seeking parliamentary powers. He had prepared his report; and it was produced last Wednesday before the Committee of the House of Lords who are considering the Bill. The leading Counsel for the promoters (Mr. Pember, Q.C.), in handing in the document, referred to it as the work of a dead man, and testified to the ability of its author, and to the respect in which he was held by his professional colleagues. His loss will be greatly felt by the London Water Companies, in view of the inquiry about to be held on the subject of the Metropolitan Water Supply, in which his valuable assistance will be greatly missed. Dr. Tidy was a striking example of exceptional natural gifts and power of application finding a suitable sphere of work; and to this, rather than to the accident of birth or education, must be attributed his advance to the foremost place among medical jurists. He was a man of exceptionally clear and vigorous thought, and usually gave expression to his views with remarkable force.

The following reference to the late Dr. Tidy appeared in the *Chemical News* last Friday: "Upon sanitary questions, especially with reference to water supply and river pollution, the deceased chemist took a prominent position. Not only was his knowledge profound, but it was ready at command. He was unrivalled in seizing at once upon the salient points of any question, and in devising experiments to test the accuracy of the arguments and theories adduced, whether by colleagues or opponents. In addition to these qualifications, he possessed in an eminent degree the uncommon faculty known as 'common sense.' Hence, Government Departments, Parliamentary Committees, Law Courts, and Municipalities accorded to his evidence an almost unlimited weight. His papers read before the Society of Arts, and his lectures delivered to the students at Lincoln's Inn, were exceedingly valuable. Here, as on all other occasions, he was distinguished for his adroitness in tearing to pieces unfounded theories, and exposing the hollowness of sensational schemes for the water supply of the Metropolis. In conjunction with Mr. Crookes and Professor Odling, he had carried on for years a searching inquiry into the quality of the London waters, and had done much to dispel the scare which had been industriously created concerning the quantity of impurities said to be swallowed yearly by the people of London in the shape of water."

Gas-Engines for Electric Lighting Stations.—The makers of the "Otto" gas-engine in Philadelphia have completed and set up two 100-horse power gas-engines—the largest ever made in America. They have been constructed for a gas company in Connecticut, who propose to couple three engines of this kind on a single shaft in a central electric lighting station. The engines have each two cylinders, placed one above the other, operating a single crank; and they are to be worked with producer gas.

The Management of the Huddersfield Gas-Works.—At the meeting of the Huddersfield Town Council last Wednesday, the Chairman of the Gas Committee (Mr. Stocks) brought forward two propositions in reference to the management of the gas-works. The first was to the effect that, owing to the impaired health of Mr. J. Burgess, the Engineer and Manager, he should berelieved of the active supervision of the works, and assist the Committee as Consulting Engineer, at his present remuneration. The second was one appointing Mr. Walter R. Herring, the Assistant-Manager, to the position formerly occupied by Mr. Burgess. In moving the latter resolution, Mr. Stocks spoke in a very appreciative manner of Mr. Herring's capabilities as a gas manager, and stated that, so far, he had proved to be a better man than the Committee anticipated. The Vice-Chairman (Mr. Culvert), in seconding the motion, also testified to the confidence felt in Mr. Herring by the members of the Committee. The motions were agreed to.

ELECTRIC LIGHTING MEMORANDA.

The Chatham Fatality—The Problem of Electrical Distribution—The Capital Expenditure of Electric Lighting Undertakings—The Affairs of the Taunton Electric Light Company.

THE remarkable fatality at Chatham is very seriously discussed, as its gravity demands, by the *Electrical Review*, which admits that this deplorable occurrence "will once more revive the fears and apprehensions with which high-tension apparatus have been generally regarded." Our candid contemporary, in insisting upon the necessity of studying this catastrophe with a view to the avoidance of similar disasters at Chatham and elsewhere, has a pointed reference to those "gentlemen of eminence in the electrical world, whose names will readily occur to our readers, who lose no opportunity of pooh-poohing, before scientific societies and in public lectures of the popular order, the risks of high-tension transformer circuits." Of these eminent personages, the well-known Electrician to the Post Office, Mr. W. H. Preece, is notoriously the head and chief. Our contemporary remarks that these gentlemen, being anxious to see electric lighting progress by leaps and bounds, entertain the delusion that by "blinding themselves, and throwing dust in the eyes of the public, they are achieving their object; but accidents such as that at Chatham have a marvellously wholesome and sobering effect upon would-be users of the light." We could say no more than this ourselves in condemnation of the peculiar kind of advocacy referred to. The technical lesson which the *Electrical Review* draws from the Chatham affair is, that "transformers must be forbidden inside houses, and must be strictly confined to the supply companies' sub-stations, or to specially constructed apparatus outside the house, and out of the public reach." It remains to be seen what Major Cardew thinks of the matter.

The fact is that the distribution of electricity presents a very sharply-defined difficulty just now, which Mr. Preece and his like are fain to try and jump over in default of ability to remove it. Low-voltage distribution recommends itself to many companies and municipalities by its undoubted superiority in the matter of danger to life and limb. But it is subject to the heavy disadvantage of requiring something like a copper mine in the streets wherever the district of supply is extensive. Even the St. James's Company, with the most concentrated district in England, have found it necessary to put down two generating stations within a few hundred yards of each other, and connect them with a line of solid copper of 8-inch section. It is this consideration that leads many eminent authorities to shake their heads over the prospects of low-voltage systems for any but the most limited areas. No central station based upon such a system can deal with a scattered district; and hence the high-pressure transformer systems offer irresistible attractions to the technicians whose aim is to keep down the price of the unit. If customers are to be picked up here, there, and everywhere, they can be reached in the cheapest way by small, high-pressure mains; but the worst of this is that the current kills and sets fire to houses upon very slight provocation. It is easy to say that the transformer, which lets down the voltage to a safe limit, ought not to be put into houses; but where else can they be stowed away so cheaply and on the whole so conveniently? Sub-stations, and a subsidiary low-pressure net-work, mean expense, which is precisely what must be avoided. The situation is full of interest.

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We have now to gather up in a concluding notice all that is to be said about certain exhibits and features of the exhibition which have not yet received their meed of attention. Nothing more need be written here with regard to the lighting display, except to put upon record the remarkable fact that we stand practically alone in pointing out how artfully individual shortcomings are concealed in the glare of the *ensemble*, and how generally poor and paltry are the "new" devices of the electric lighting artist. An engineering contemporary ventures to protest feebly against the absurdity of making incandescent bulbs imitate oil-lamps and candles, because in this way one of the essential features of this method of lighting—its independence of vertical supports, and consequent shadelessness—is counteracted. Not one of the journals nominally devoted to the interests of art, however—not a single illustrated weekly or other newspaper, so far as we have been able to scan their references to the exhibition—has done even so much as this to correct the glaring errors of the electricians. It is understood that the ordinary attitude of the newspaper reporter in face of an electric light is that of gaping wonder; and in the undiscriminating praise with which the electrical fittings at the Palace have been greeted in the papers, we have another piece of evidence, if such were needed, of the vacuity with which the conductors of these media of public instruction continue to regard everything done by electricians in the name of "progress." However costly in production, false in art, trumpery in technique, and outrageous in design, the work of the electrician may be, it is sufficient excuse that his is "the light of the future," for the average newspaper writer to praise it to the skies. Though we were wholly unsupported in our opinion of the incapacity of most makers of electric light fittings to treat the incandescent lamp in an artistic—that is to say, a sensible—way, we should continue to assert this as forming one of the most striking of the lessons of the Crystal Palace display.

An electrical contemporary has complained of the prominence of overhead wires and their necessary supports, which are truly described as the reverse of ornamental. It is suggested that these unlovely adjuncts of electrical distribution might have been fixed out of sight, or at least minimized by being kept in strict subordination to the architectural features of the building. From our point of view, it is just as well that this course has not been adopted; for since wires are indispensable in connection with electrical distribution, they may be advantageously displayed for the instruction of all who are interested in this kind of enterprise.

In addition to the lighting of the model theatre by Messrs. Siemens Bros., which was described in an earlier article, one or two other "side shows" of a more or less attractive character have been on view during the last month, upon payment of a modest extra charge. The best of these, from the educational standpoint, was the illustration given by Messrs. Siemens Bros. of certain effects of a current of 50,000 volts. This exaggerated voltage was obtained by "transforming up" from a current generated by a Siemens dynamo driven by a Willans engine; and it was really a striking sight to see the stream of sparks that emanated from a terminal of the conductor so charged, when separated from the complementary terminal by a sheet of plate glass. The discharge tore, spitting viciously, over the intercepting non-conductor in a violently agitated network of purple fire, until eventually the local heat shattered the glass, and the current passed after the manner of its desire. The demonstration was not shown for long; and it was succeeded by an exhibit of electrical heating and cooking apparatus installed under the auspices of Messrs. Crompton and Co. A room has been fitted up with the usual appurtenances of a show-kitchen—stewpans, kettles, &c.—to which are added several devices exemplifying the application of high-power electricity to domestic purposes, including the driving of pumps, knife-cleaning machines, ventilating-fans, boot-cleaners, coffee-grinders, and so forth, not even excluding cigar-lighters. The moving machinery is, of course, driven by small electro-motors; but the heating is done by causing electricity to traverse small wires offering high resistance to it, which are embedded in a layer of enamel attached to the article intended to be made hot. In the case of a flat iron, for instance, the implement has a false bottom, which is hollowed out to receive a layer of enamel packed with zig-zigs of the resistance wires. The two terminals of these are connected by insulated wires to a conveniently placed wall or bench point, where contact can be made with the lighting circuit. When this is done, in the course of a minute or two the heat developed by the resistance wires spreads through the mass of enamel and the working surface of the flat iron, which is thus fitted for use in the ordinary way. The same principle is carried through the other apparatus. Thus a kettle is made to boil water by the heat developed in its false bottom, and a hot-plate for cooking is similarly prepared. The whole affair, of course, is nothing more than an arrangement of electrical toys. Nor is there anything new in the idea; for, if we are not mistaken, Mr. Lane-Fox took out a patent for apparatus of the same character ten years ago. Nobody takes Messrs. Crompton's demonstration seriously; but if this were to happen, it would become necessary to lay stress upon the fact, pointed out by an electrical contemporary, that "such electrical luxuries are only obtainable by those possessing ample means." And these are precisely the people who, as a rule, hold the kitchen as far too sacred a place to be invaded with fantastical arrangements of this kind.

One of the few novelties in the exhibition proper is the so-called "Midget" arc lamp shown by Messrs. Woodhouse and Rawson. This is a neat little lamp, stated to develop 250 candle power at 45 volts and 5 amperes, or about three lamps to 1-horse power. They are very steady, and to all appearance effective. If the pattern answers in actual service, it should be useful to shopkeepers, as being of a more manageable brilliancy than the usual arc lamps, and more economical than the incandescent form.

The critic of engine driving, of belts, lubrication, &c., will see much to interest him at the different stands in the machine-room and in the Nave. The newest electric lighting practice favours the high-speed, directly-connected engine; but it is impossible to watch these machines, with their piston-rods going like the needle of a sewing-machine in a hurry, without thinking about wear and tear, and of what would happen if the attendant failed in his regular duty. Prominent use is made of link leather belting, which certainly flaps less than solid belts, but needs to be considerably wider to carry the same power. There is no rope driving. We complained last week that the gas-engine makers have betrayed a want of enterprise in failing to show a big motor; but the same reproach lies upon the electricians and their machinist allies, for not exhibiting electrical traction, or the utilization of water power for electrical purposes. There is, it is quite true, a so-called electrical tramcar upon the Brush Company's stand; but this exhibit succeeds best in illustrating an old weakness of its kind—it is a fixture. The catalogue says that "electro-motive power appears to be the ideal form of traction for tramway work;" but unfortunately this verbal statement does not carry us very far when we desire to learn how the ideal is to become the real. One would have thought that, if there had been any business in electrical traction, some proof of the fact would have been offered in connection with the exhibition. Again, Professor Forbes has lately told the world that, in certain circumstances, water power can be made available to compensate for the difference between the maximum and actual loads, which is such a serious obstacle in the way of the commercial success of central electric lighting stations. At the Crystal Palace there are huge elevated reservoirs doing nothing at this season of the year, but used in summer for supplying the great fountains. Why were they not employed to demonstrate the possibilities of turbine driving for dynamos, with or without reference to Professor Forbes's views? Or why was there no arrangement for transmitting power from the lower lakes in the Palace Grounds to the exhibition, either by a repetition of the Frankfort-Lauffen experiment or otherwise?

These are questions very much to the point, for which no satisfactory answer can really be obtained. The exhibitors at Sydenham seem to prefer playing with search-light projectors, with the illumination of fountains, the display of inferior imitation fireworks, the cooking of cutlets, and so on, to seriously tackling any of the known problems of the electric lighting industry. Consequently, they must not complain if critical

ELECTRIC LIGHTING MEMORANDA.

The Chatham Fatality—The Problem of Electrical Distribution—The Capital Expenditure of Electric Lighting Undertakings—The Affairs of the Taunton Electric Light Company.

THE remarkable fatality at Chatham is very seriously discussed, as its gravity demands, by the *Electrical Review*, which admits that this deplorable occurrence "will once more revive the fears and apprehensions with which high-tension apparatus have been generally regarded." Our candid contemporary, in insisting upon the necessity of studying this catastrophe with a view to the avoidance of similar disasters at Chatham and elsewhere, has a pointed reference to those "gentlemen of eminence in the electrical world, whose names will readily occur to our readers, who lose no opportunity of pooh-poohing, before scientific societies and in public lectures of the popular order, the risks of high-tension transformer circuits." Of these eminent personages, the well-known Electrician to the Post Office, Mr. W. H. Preece, is notoriously the head and chief. Our contemporary remarks that these gentlemen, being anxious to see electric lighting progress by leaps and bounds, entertain the delusion that by "blinding themselves, and throwing dust in the eyes of the public, they are achieving their object; but accidents such as that at Chatham have a marvellously wholesome and sobering effect upon would-be users of the light." We could say no more than this ourselves in condemnation of the peculiar kind of advocacy referred to. The technical lesson which the *Electrical Review* draws from the Chatham affair is, that "transformers must be forbidden inside houses, and must be strictly confined to the supply companies' sub-stations, or to specially constructed apparatus outside the house, and out of the public reach." It remains to be seen what Major Cardew thinks of the matter.

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We have now to gather up in a concluding notice all that is to be said about certain exhibits and features of the exhibition which have not yet received their meed of attention. Nothing more need be written here with regard to the lighting display, except to put upon record the remarkable fact that we stand practically alone in pointing out how artfully individual shortcomings are concealed in the glare of the *ensemble*, and how generally poor and paltry are the "new" devices of the electric lighting artist. An engineering contemporary ventures to protest feebly against the absurdity of making incandescent bulbs imitate oil-lamps and candles, because in this way one of the essential features of this method of lighting—its independence of vertical supports, and consequent shadelessness—is counteracted. Not one of the journals nominally devoted to the interests of art, however—not a single illustrated weekly or other newspaper, so far as we have been able to scan their references to the exhibition—has done even so much as this to correct the glaring errors of the electricians. It is understood that the ordinary attitude of the newspaper reporter in face of an electric light is that of gaping wonder; and in the undiscriminating praise with which the electrical fittings at the Palace have been greeted in the papers, we have another piece of evidence, if such were needed, of the vacuity with which the conductors of these media of public instruction continue to regard everything done by electricians in the name of "progress." However costly in production, false in art, trumpery in technique, and outrageous in design, the work of the electrician may be, it is sufficient excuse that his is "the light of the future," for the average newspaper writer to praise it to the skies. Though we were wholly unsupported in our opinion of the incapacity of most makers of electric light fittings to treat the incandescent lamp in an artistic—that is to say, a sensible—way, we should continue to assert this as forming one of the most striking of the lessons of the Crystal Palace display.

An electrical contemporary has complained of the prominence of overhead wires and their necessary supports, which are truly described as the reverse of ornamental. It is suggested that these unlovely adjuncts of electrical distribution might have been fixed out of sight, or at least minimized by being kept in strict subordination to the architectural features of the building. From our point of view, it is just as well that this course has not been adopted; for since wires are indispensable in connection with electrical distribution, they may be advantageously displayed for the instruction of all who are interested in this kind of enterprise.

In addition to the lighting of the model theatre by Messrs. Siemens Bros., which was described in an earlier article, one or two other "side shows" of a more or less attractive character have been on view during the last month, upon payment of a modest extra charge. The best of these, from the educational standpoint, was the illustration given by Messrs. Siemens Bros. of certain effects of a current of 50,000 volts. This exaggerated voltage was obtained by "transforming up" from a current generated by a Siemens dynamo driven by a Willans engine; and it was really a striking sight to see the stream of sparks that emanated from a terminal of the conductor so charged, when separated from the complementary terminal by a sheet of plate glass. The discharge tore, spitting viciously, over the intercepting non-conductor in a violently agitated network of purple fire, until eventually the local heat shattered the glass, and the current passed after the manner of its desire. The demonstration was not shown for long; and it was succeeded by an exhibit of electrical heating and cooking apparatus installed under the auspices of Messrs. Crompton and Co. A room has been fitted up with the usual appurtenances of a show-kitchen—stewpans, kettles, &c.—to which are added several devices exemplifying the application of high-power electricity to domestic purposes, including the driving of pumps, knife-cleaning machines, ventilating-fans, boot-cleaners, coffee-grinders, and so forth, not even excluding cigar-lighters. The moving machinery is, of course, driven by small electro-motors; but the heating is done by causing electricity to traverse small wires offering high resistance to it, which are embedded in a layer of enamel attached to the article intended to be made hot. In the case of a flat iron, for instance, the implement has a false bottom, which is hollowed out to receive a layer of enamel packed with zig-zigs of the resistance wires. The two terminals of these are connected by insulated wires to a conveniently placed wall or bench point, where contact can be made with the lighting circuit. When this is done, in the course of a minute or two the heat developed by the resistance wires spreads through the mass of enamel and the working surface of the flat iron, which is thus fitted for use in the ordinary way. The same principle is carried through the other apparatus. Thus a kettle is made to boil water by the heat developed in its false bottom, and a hot-plate for cooking is similarly prepared. The whole affair, of course, is nothing more than an arrangement of electrical toys. Nor is there anything new in the idea; for, if we are not mistaken, Mr. Lane-Fox took out a patent for apparatus of the same character ten years ago. Nobody takes Messrs. Crompton's demonstration seriously; but if this were to happen, it would become necessary to lay stress upon the fact, pointed out by an electrical contemporary, that "such electrical luxuries are only obtainable by those possessing ample means." And these are precisely the people who, as a rule, hold the kitchen as far too sacred a place to be invaded with fantastical arrangements of this kind.

One of the few novelties in the exhibition proper is the so-called "Midget" arc lamp shown by Messrs. Woodhouse and Rawson. This is a neat little lamp, stated to develop 250 candle power at 45 volts and 5 amperes, or about three lamps to 1-horse power. They are very steady, and to all appearance effective. If the pattern answers in actual service, it should be useful to shopkeepers, as being of a more manageable brilliancy than the usual arc lamps, and more economical than the incandescent form.

The critic of engine driving, of belts, lubrication, &c., will see much to interest him at the different stands in the machine-room and in the Nave. The newest electric lighting practice favours the high-speed, directly-connected engine; but it is impossible to watch these machines, with their piston-rods going like the needle of a sewing-machine in a hurry, without thinking about wear and tear, and of what would happen if the attendant failed in his regular duty. Prominent use is made of link leather belting, which certainly flaps less than solid belts, but needs to be considerably wider to carry the same power. There is no rope driving. We complained last week that the gas-engine makers have betrayed a want of enterprise in failing to show a big motor; but the same reproach lies upon the electricians and their machinist allies, for not exhibiting electrical traction, or the utilization of water power for electrical purposes. There is, it is quite true, a so-called electrical tramcar upon the Brush Company's stand; but this exhibit succeeds best in illustrating an old weakness of its kind—it is a fixture. The catalogue says that "electro-motive power appears to be the ideal form of traction for tramway work;" but unfortunately this verbal statement does not carry us very far when we desire to learn how the ideal is to become the real. One would have thought that, if there had been any business in electrical traction, some proof of the fact would have been offered in connection with the exhibition. Again, Professor Forbes has lately told the world that, in certain circumstances, water power can be made available to compensate for the difference between the maximum and actual loads, which is such a serious obstacle in the way of the commercial success of central electric lighting stations. At the Crystal Palace there are huge elevated reservoirs doing nothing at this season of the year, but used in summer for supplying the great fountains. Why were they not employed to demonstrate the possibilities of turbine driving for dynamos, with or without reference to Professor Forbes's views? Or why was there no arrangement for transmitting power from the lower lakes in the Palace Grounds to the exhibition, either by a repetition of the Frankfort-Lauffen experiment or otherwise?

These are questions very much to the point, for which no satisfactory answer can really be obtained. The exhibitors at Sydenham seem to prefer playing with search-light projectors, with the illumination of fountains, the display of inferior imitation fireworks, the cooking of cutlets, and so on, to seriously tackling any of the known problems of the electric lighting industry. Consequently, they must not complain if critical

observers of their proceedings fail to see anything new or specially noteworthy in them, and condemn those who have so obviously wasted a good opportunity. We still maintain, in defiance of much that might be urged to the contrary, that the exhibition is worth a visit; but it is so perhaps rather more for what it does not, than for what it does, contain. At any rate, if this judgment reads as being somewhat too severe, let us say that the things which, to use the hackneyed but expressive phrase, are "conspicuous by their absence" from this show, are quite as instructive by virtue of the very fact, as most of the things that can be seen.

Books Received.—Chapters on Finance—including the London Water Companies—from Burdett's "Official Intelligence" for 1892. (London: Spottiswoode and Co.) "Continental Electric Light Central Stations," by Killingworth Hedges, M. Inst. C. E., M. Inst. E. E. (London: E. and F. N. Spon.)

Society of Engineers.—At the meeting of this Society on Monday, March 7, a paper was read by Mr. Sellon on "Electrical Traction and its Financial Aspect." The author commenced by describing the best known electrical systems—viz., the accumulator, the overhead, and the open and closed conduit types. He then at great length dealt with the commercial part of the question; taking a hypothetical case of three miles of tramway, which it was proposed to furnish with an equipment sufficient for a ten-minute service by either horse, cable, or electricity. The capital cost and working expenditure of each system was closely gone into; the rate per car mile being based on a car mileage of 197,000 miles. The cost per car mile given for working by horses was 7d.; by cable, 7d.; by the overhead and conduit system, 3·9d. On adding, however, the interest on capital expenditure, the author claimed that traction by cable was less economical than that by horse traction, and that the amounts saved per annum by the overhead and conduit systems, compared with a horse tramway, gave an increased dividend on the ordinary share capital of upwards of 6 per cent. per annum in the case of the overhead system, and of 5 per cent. per annum with a conduit system.

The Electric Light and Eyesight.—A discussion has been going on in the columns of *Lightning*, as to the effect of the electric light on the eyes. It has been summed up by Mr. G. Hartridge, of the Royal Westminster Ophthalmic Hospital, who gives the verdict in favour of the incandescent system. He says the chief difficulty—and it is one which experience alone can overcome—is the placing of the light in such a position, and shading it in such a manner, as to prevent any of the direct rays falling upon the eyes. If proper conditions are observed, even those eyes that are unduly sensitive, or the victims of disease, may work longer, and with less risk or discomfort, under the electric light than with gas, oil, or candles. We may venture to add that it is just the neglect to observe these "proper conditions" which causes so many people to complain of injury to the sight by the use of the last-named illuminants, two of which —gas and oil—certainly run the incandescent electric light very closely indeed, if they do not supersede it, for brilliancy, steadiness, and reliability. Mr. C. Higgens, F.R.C.S., who has also been questioned on the subject, considers the electric light, when steady, to be second only to daylight; but he cannot imagine anything more "worrying and irritating to the eyes" than a light which keeps "jumping up and down," as he has noticed many incandescent lamps doing.

The Yield of Ammonia from Coal.—At a recent meeting of the North-East Coast Institution of Engineers and Shipbuilders, at Newcastle-on-Tyne, the President (Mr. J. Wigham Richardson), in the course of a personal explanation, referred to some correspondence which had taken place between him and the Chairman of the Newcastle Gas Company (Mr. W. B. Wilkinson), and also from Mr. E. A. Hedley, in reference to the yield of ammonia from coal. At a previous meeting of the Institution, Mr. Richardson alluded to the very high dividend (50 per cent.) just paid by Messrs. Brunner, Mond, and Co.; and stated that this was perhaps not very extraordinary, considering that the cost of coal to them was less than nothing. The circulation of this statement by the newspapers brought forth kindly and courteous letters from Mr. Wilkinson and Mr. Hedley, casting some doubt upon the accuracy of Mr. Richardson's figures as to the yield of sulphate of ammonia per ton of coal. Mr. Wilkinson pointed out that the recovery of ammonia by Mr. Mond cost a great deal for acid and labour, and that the price had fallen from £12 to £10 10s. per ton. This Mr. Richardson said he did not dispute. Then Mr. Wilkinson went on to say that 30 lbs. of sulphate per ton of coal was considered excellent by gas companies; and he doubted if much more could really be obtained. Upon this Mr. Richardson wrote to Mr. Mond on the matter; and this gentleman sent a reply from Italy. He said their yield of ammonia on a large scale amounts, on an average, to 32 kilos. or about 70 lbs. per ton of coal; 125 tons turning out 4 tons of sulphate. Mr. Richardson said he had quoted the two differing authorities; and this was all his knowledge enabled him to do. He felt confident, however, that if 70 lbs., instead of only 30 lbs., of sulphate could be extracted from a ton of Newcastle coal, Mr. Wilkinson and the able staff of his Company would do it. He expressed the hope that this result might be achieved.

NOTES.

The Direct Conversion of Heat into Electricity.

It is no more than might be expected, that contemporary disturbances of the coal market have revived the hitherto unrealized idea of the possibility of directly converting heat into electricity for lighting purposes. Some newspaper writers are yet hazy as to the means by which the electric light is actually produced; for comments upon the coal miners' strike, in which it is taken for granted that the electricians will profit by the possible embarrassment of gas manufacturers, have appeared in more than one widely-circulated "organ of public opinion." It is therefore as well to remark that not only are electricians fully as dependent upon coal as gas engineers, but that there is also no apparent prospect of their being differently situated. According to a calculation by Herr R. J. Gülcher, the electrical energy obtainable in a useful form from a steam-driven dynamo is only 6·4 per cent. of the potential energy of the coal burnt in the boiler; but even this poor efficiency is eighteen times greater than that of the best-known arrangement for the direct conversion of heat into electricity—the Noë and Clamond thermo-battery—where the efficiency works out to only 0·35 per cent. of the potentiality of the gas burnt. Seeing that the modern dynamo and steam-engine do not leave much scope for improvement, Herr Gülcher has turned his attention to the thermo-battery, which ought to be a very much more efficient arrangement than it is. Although he has not succeeded in revolutionizing the ordinary methods of procuring electricity, Herr Gülcher claims to have made a thermo-battery composed of tubes of nickel and an antimonial alloy which gives electricity equal in amount to the output of two Bunsen cells for a consumption of 7¼ cubic feet of gas per hour. It is quite evident, however, that thermo-batteries still leave a good deal to be desired.

The Stability of Petroleum Compounds.

The remarkable stability of the petroleum compounds is noticed by Mr. H. K. Warren in the *Chemical News*. He observes that whether these exist in the solid or the fluid state, elevation of temperature simply changes them into more gaseous compounds, which retain their former properties. For instance, if petroleum, boiling at a low temperature, is passed through heated tubes, it merely becomes fractionized into compounds boiling at temperatures in accordance with the temperature to which it has been subjected, until a red heat is reached, when a true gaseous hydrocarbon is obtained, burning with the ordinary luminosity of these compounds, and capable of reducing certain metallic oxides at an elevated temperature, at the same time forming substitutional compounds with the elements bromine, chlorine, &c. The striking peculiarity of the petroleums is that, although somewhat readily changed by heat, they most stubbornly resist the most powerful oxidizing agents. For instance, Mr. Warren remarks that few, if any, compounds can resist the oxidizing influence of fused nitre; yet petroleum may be passed through this substance with impunity, even when it is at a red heat, and can be afterwards collected unchanged. Boiling nitric acid, moreover, has no effect upon fluid or solid petroleum compounds. The only oxidizing agent which seems able to touch them is chlorochromic acid, which, when shaken up with petroleum and water, changes the former into a semi-wax-like substance melting at 400°, and possessing an undetermined composition.

[Painting Oils and Varnishes.

Mr. Hugo Müller, in reviewing in *Nature* Professor Church's work on the "Chemistry of Paints and Painting," remarks that there is still much to be learnt with regard to the chemical processes involved in the so-called drying of linseed oil. He seems to think that, in order to exert its best and most lasting preservative effect, a paint ground in linseed oil should not be too freely exposed to air and sunlight immediately after application. The subject requires to be further investigated. Mr. Müller points out that linseed oil under certain conditions becomes a powerful oxidizer; so much so that canvas or paper soaked with it becomes destroyed in the course of time, and it seems that this effect is specially marked when oil of turpentine has been mixed with it. Linseed oil cannot, however, be dispensed with; but it is otherwise with turpentine, for which a very much superior substitute is available in the higher members of the benzene series, which could now, Mr. Müller thinks, be obtained at a sufficiently moderate cost if a demand for them should ever arise. These hydrocarbons, while indifferent to the action of atmospheric oxygen, possess greater solvent power than any other; and on this account they are well adapted for the preparation of varnishes. For this latter purpose, however, a still more suitable vehicle is recommended, in the shape of amylic acetate, which is capable of dissolving the hardest copals after these have been powdered and kept for some time in a hot closet. The preparation of protective varnishes is, however, a secret trade; and all such commodities should be tested by laying a film upon glass, when they should dry without cracking or showing the slightest bloom on the surface or in the substance of the layer. This last appearance is due to the exudation of minute particles of solid fatty acids originally contained in the linseed oil used in the preparation of the varnish.

COMMUNICATED ARTICLE.

COAL GAS: ITS MANUFACTURE, DISTRIBUTION, AND CONSUMPTION.

A Series of Articles for Gas Students.

(*Continued from p.* 440.)*

RETORTS, &c.

The retort, or still, in which the coal is carbonized is well known to all gas students. It may be of cast iron or fire-clay; and either hand or machine made. The fire-clay retort now almost universally used may be of the usual type, made all in one piece, or it may be constructed in blocks or sections, while some engineers prefer to use brick retorts.

A fire-clay that is to be employed in gas-retort or furnace work should consist chiefly of silica and alumina. The more alumina there is in proportion to the silica, the more infusible will be the clay. There will also be present oxide of iron, magnesia, and other alkaline earths; but the presence of these in large proportions will render the clay less refractory—*i.e.*, more liable to fusion—and useless for the purpose. Extremely small quantities of lime, potash, or soda may, however, improve the clay by soldering the particles firmly together.—(Percy's "Metallurgy.") The presence of oxide of iron will discolour the clay. A good fire-clay should have a uniform texture, a somewhat greasy feel, and (except as just noted) be free from any of the alkaline earths. A fire-clay with a coarse open grain will probably prove more refractory than one with a finer texture.

The chemical composition is not a safe indication of the refractory qualities of fire-clay; but a good sample will contain from 62 to 70 per cent. of silica and 24 to 30 per cent. of alumina. Analyses of Stourbridge fire-clay (much used and recommended) have given—

Silica	69·8
Alumina	26·5
Lime, &c.	1·3
Oxide of iron	2·4
	100·0

Ganister, a sandstone also from the coal measures, and much used in the lining of blast-furnace cupolas, is utilized, mixed with other clays, in the manufacture of fire-bricks, and imparts thereto a degree of refractoriness, but also friability. Hence it renders them useless for positions where they would be liable to damage by stokers' tools.

The best fire-clays are obtained from Worcestershire, Staffordshire, Yorkshire, Northumberland, and Derbyshire, as well as from a few other English, and several of the Scottish counties—principally either in the coal measures or in close proximity thereto.

Cast-iron retorts were at one time used exclusively. As far as the writer's memory serves, it was in Scotland that fire-clay retorts were first used; and they gave rise to a bitter and hardly-fought controversy relative to the respective merits of the two systems. At the present day, iron retorts are employed in only very small works, where constant letting down and re-heating is unavoidable, or in certain positions of a setting where they will not be exposed to the fiercest heat. The reason of this is that iron retorts are not capable of standing the high temperatures now in vogue without rapid oxidation and even fusion. If subjected to heats most suitable for economical carbonization, the retort would soon be burnt off. Moreover, unless made in very good metal, it is liable to uneven expansion on heating, with consequent distortions of the retorts; thus rendering satisfactory charges impossible. When iron retorts are used, they should be ribbed after the pattern introduced by Mr. A. C. Fraser.† The ribs tend to maintain the original form of the retort.

The advantages of fire-clay retorts may be briefly summarized thus: (1) Higher yield of gas per ton and per mouthpiece, with consequent reduction of cost of labour and coal. (2) More even yield of gas. Fire-clay, being an indifferent conductor of heat, takes more time in heating up, and for the same reason does not part so readily with its heat. The temperatures of fire-clay retorts are therefore more evenly maintained, with a resultant better yield of higher quality gas. (3) Much greater durability of the retort. The lifetime of a clay retort in a good setting has been given as three winter and two summer seasons. With the exercise of every care in letting down heats, and in the general working of the retorts, this period is often exceeded.

Brick retorts are very successfully used at some works. Their supposed disadvantages are chiefly: Excessive first cost as compared with the other systems, due to the larger amount of material necessarily contained in such settings, and a corresponding increase of labour in erecting; and the larger percentage of fuel requisite in maintaining the necessary heats for carbonization, owing to the excess of internal material. These objections are, however, considered by many engineers to be somewhat apocryphal. The first is met by the admitted superiority of the setting as regards lasting capabilities, by the facility with which any needed repairs can be executed, and at a fractional cost as compared with fire-clay retorts. Such settings, now in good condition and doing well, have, to the writer's knowledge, been at work for the past seven years, only requiring during the summer months such ordinary repairs as can be carried out without interfering in any way with the setting. During the same period, a fire-clay retort setting would have been pulled down and re-erected two or three times. The second objection is to a great extent untrue. The setting will probably take more fuel to raise it to the requisite heat from the cold; but, once hot, the extra amount of material will act like the heavy fly-wheel of a steam-engine, and tend to maintain the retorts at a more even temperature, with very satisfactory carbonizing results.

There are three principal patterns of retorts in use—viz., the ⏢, the oval, and the circular—and there are advocates for each shape. Their respective advantages may be summarized as follows: For the circular and oval sections, greater strength and durability is claimed; but the oval and ⏢ sections are certainly better adapted for carbonizing than the circular form, owing to the greater area allowed for spreading the coal in the retort, and the reduction of the thickness of the charge.

Retort-Settings.

Settings of retorts may consist of two, three, five, and up to as many as eleven in one oven; the number depending on the requirements of the establishment. In works of average size, "through" retorts—*i.e.*, the benches built back to back, the retorts being continuous, and having a mouthpiece at each end, so as to be chargeable from either side—are now much used. The following are the principal advantages of this arrangement: In the first place, much less carbon is formed on the retorts, and this is more easily removed. Here is effected a saving in the wear and tear of the retort, through the reduction of the heavy scurfing work. (This is, however, largely obviated with the modern "singles," which are so constructed as to allow of readily opening the back ends, when required, for scurfing.) Secondly, the retorts are more evenly heated right through, and the coke is more easily extracted. Consequently, carbonization is carried on more economically and expeditiously.

Mention must be made of the scurf, or deposit of carbon, which goes on incessantly during the working of retorts. This carbon adheres to the sides and top of the retort, and, gradually increasing in quantity, tends not only to reduce the workable sectional area, but also to lower the heat of the bed. It should not be allowed to accumulate considerably, for the reasons just given, and also because the usual means adopted for its removal must more or less damage the retort. The deposition of carbon is retarded chiefly by relieving the retorts from the internal pressure of gas by means of an exhauster, and also to a great extent by the use of the "through" retorts just mentioned, as currents of air are constantly drawn through whenever the retorts are charged, and the carbon is in part thereby oxidized and loosened.

The removal of carbon (or "scurfing," as it is called) is usually effected by chisel-shaped steel bars, applied after the retorts have been allowed to stand off for a period. A very satisfactory plan, obviating the use of the scurfing-bars, and any consequent damage to the retorts, is as follows: Take off the cap of the ascension-pipe at one end of the retort, and open the door at the other end. With single retorts, this will be done by means of the removable back end just referred to. A complete and sharp current of air throughout the retort immediately ensues. Two fire-clay blocks cut to the shape of the retort, but slightly smaller, are then placed inside—one about the centre, the other, to commence with, at the open end of the retort—and gradually moved towards the centre, as the carbon drops off. The blocks cause the heated currents of air to inpinge directly on the carbon surrounding them, thus removing it, inch by inch, until the whole retort is clean; and this is done without the application of a single bar. When one-half of the retort is scurfed, the process is reversed, and the block worked back from the opposite end.

In designing a setting of retorts, the following are important considerations to be borne in mind: (1) An equal heating, as far as possible, of the whole of the retorts—tops, centres, and bottoms. This will chiefly be provided for in the arrangements of the heat passages, flues, &c. (2) The prevention of undue wear, by fusion or otherwise, of any one portion of the setting; but the attainment rather of an equal wear and tear all round. This will also largely depend upon the means employed for distributing the caloric of the bench, and suitably protecting those portions which would otherwise be subject to too intense currents of heat. (3) A system of support to the retorts, that shall provide for the maintenance throughout of the original forms of the retorts, passages, flues, &c., without the presence in the setting of any excess of brickwork. A system of flimsy supports to retorts, based on ideas of readily heating up the bench, is false economy. While an unnecessary amount of material is undesirable, it must be borne in mind that a light setting, if quickly heated up, just as readily loses its heat, and cannot therefore maintain such an equality of temperature as is consistent with good work. Moreover, the liability to collapse, through some of the light portions being burnt through, is a contingency not to be tolerated.

The sizes of retorts in ordinary gas-works (Newbigging's

* *Errata.*—In the first table under the head of "Coals" in the article which appeared on the 8th inst., the figures for lignite should have been given as follows: Carbon, 71·36; hydrogen, 2·71; oxygen, 25·93. In the second table, the percentage of sulphur, ash, &c., in cannel should have been 7·45.

† These retorts are described in King's "Treatise on Coal Gas," Vol. I., p. 181, and in Newbigging's "Handbook" (fifth edition), p. 72.

"Handbook") are: Oval, 21 in. by 15 in.; D, 18 in. by 15 in.; circular, 15 in.—diameter. Length—8 ft. to 9 ft. 6 in. (single lengths).

Two principal means of heating retort-ovens can be made use of. The retort may be heated by *direct conduction* from the furnace, or by making the currents of caloric traverse various passages around the retorts and throughout the ovens, and be thus absorbed by the setting. The latter method is that chiefly adopted. The ordinary fuel used for firing the furnaces is coke; about 20 per cent. of the entire make at a well-managed works being utilized for this purpose. When used in the ordinary furnaces, it will be necessary, in order to maintain satisfactory heats throughout the setting, to fire up every two hours at the least, and periodically to shake up the furnace-bars, so as to loosen the clinker, and ensure the easy passage of atmospheric air through the burning mass. The furnace must be cleaned out every 12 hours, and thoroughly clinkered every 24 hours. If this be not done, the clinker forming on the sides and bars of the furnace will rapidly accumulate and harden, and soon prevent the possibility of complete removal. The result will, of course, be a lowering of heats, a reduction of the cubical contents of the furnace, and a very serious deterioration of the furnace walls and bars. The ash-pan should always be kept clean and full of water. This will tend to preserve the bars, aid in the combustion of the coke, prevent the undue access of cold atmospheric air through the bottom of the furnace, and keep the clinker soft.

Mr. Livesey and others have recommended the use, under certain circumstances bearing on the relative market values of the two commodities, of tar as a fuel for heating the furnace, in substitution for coke. This can easily be arranged for by bricking up the ordinary coke-firing doorway, and filling up part of the furnace with coke or breeze. Suitable spaces will be provided for the admission of atmospheric air. The tar travels into the furnace by some suitable channel, in a small stream.

An important matter, bearing on the successful working of the ordinary coke furnace, is the periodical cleaning out of all the flues accessible in the setting, where there is likely to be any accumulation of dust. This practice will be an important aid to the maintenance of good heats.

There are now in use two methods of heating retort-settings—the direct firing, with the ordinary furnaces just referred to; and the generative plan, where the retorts are heated by the combustion of gases which arise from the incomplete combustion of coke in a generator which may be, or may not be, distinct from the setting.

Coke, being principally carbon, produces on complete oxidation, carbonic acid gas, or more correctly, carbon dioxide (CO_2). If, however, the supply of air be limited, the carbon dioxide formed at the lower part of a burning mass of coke will, on passing upwards through the incandescent coke, take up another atom of carbon, forming carbonic oxide (CO). This gas, on meeting with oxygen or atmospheric air, takes up another atom of oxygen, burns with an intense heat, and is again resolved into carbon dioxide. Here we have the principles of regenerative firing as applied to the heating of gas-retorts. The carbonic oxide is the medium utilized for the production of the caloric inside the oven. The *modus operandi* is as follows: Coke is placed in bulk in a generator, which is provided at the bottom with close bars, and to which is admitted, either at the bottom or through the lower portion of the walls, a limited supply of atmospheric air. This is termed the *primary* air supply. The upper portion of the generator communicates, directly or indirectly, with the combustion chamber, which is arranged around the retorts. The volumes of carbonic oxide as they are produced in the generator are thus conveyed to the combustion chamber, and there meet with fresh supplies of heated atmospheric air—the *secondary* air supply. The carbonic oxide here burns, producing carbon dioxide, and emitting an intense heat. The secondary air supply is heated, prior to combustion, by conveyance through a series of passages constructed in the hottest positions around the generator. The advantages of the system are: Better and more even heats, and more effectual control generally in regulating the temperature of the setting; greater facilities for firing, clinkering, &c., with a resulting reduction of labour; considerable saving in the fuel account, as the furnaces can be maintained by the expenditure of from 65 to 75 per cent. of the coke required to heat the ordinary furnaces. In the regenerative furnace proper, the *primary* air, as well as the *secondary* air, is heated up before admission to the point of combustion. The arrangement is considered too costly for general adoption, as the advantages derived are not important.

Many engineers have adopted a modification of the regenerative system, which may be applied to an ordinary setting. The section of the furnace is somewhat altered; being constructed much deeper and narrower. The primary-air supply under the furnace bars is limited, and a secondary supply is provided, which is itself heated by passages usually constructed between the flues of the bottom retorts. The furnace is practically converted into a generator. The advantages of these modifications are not, of course, equal to the adoption of the system in its entirety.

(To be continued.)

Mr. J. Lee, of Crossgates, Leeds, has been appointed, out of 100 applicants, Manager of the Wirksworth Gas Company,

TECHNICAL RECORD.

EASTERN COUNTIES GAS MANAGERS' ASSOCIATION.

The Seventh General Meeting of this Association was held on Wednesday last, at Sleaford. About noon, the members assembled at the gas-works, where refreshments had been kindly provided; and every possible attention was paid to their visitors by the popular and genial Secretary (Mr. H. Wimhurst), his wife, and other lady friends. Several of the members took the opportunity of inspecting the works, which, though small, are admirably arranged and present a very neat appearance. Before quitting the works, the company were photographed; and immediately afterwards they proceeded to the Town Hall, where the business of the day began shortly after 1.30. At the commencement, Mr. J. Carter (Lincoln), the retiring President, occupied the chair.

A Welcome to the Town.

The President remarked that the Association were favoured with the presence of the Chairman of the Sleaford Gas Company (Mr. W. C. Allen); and he would ask him to address a few observations to the members.

Mr. Allen said, on behalf of the Gas Company, and, he might add, on behalf of the town, he had great pleasure in welcoming the Association that day. He congratulated the members on the numerously attended meeting, and on the fine day which they had for it. He trusted that, as on past occasions, the present meeting would result in the spread of information. These gatherings, he believed, were conducive to the interests of gas managers generally, and to gas companies in particular. He was very pleased they had seen their way clear to visit Sleaford; and he hoped it would not be the last time they would have the pleasure of welcoming the Association to the town.

The President observed that it was his pleasing duty to acknowledge the kind words which Mr. Allen had addressed to them. As they visited the various towns in the district represented by the Association, it was a general thing with them to enjoy hearty receptions by gentlemen occupying positions of considerable local importance. It was an experience with which they were very familiar; and it was one of the instances in which "familiarity" did not "breed contempt." They were very much obliged to Mr. Allen for the hearty welcome he had given to them to the beautiful little town of Sleaford.

Minutes of Last Meeting.

The Hon. Secretary (Mr. H. Wimhurst) then read the minutes of the meeting held at Cambridge in September last; and on the motion of Mr. W. Duesbury (Cambridge), seconded by Mr. W. Barratt (Grantham), they were confirmed.

New Members.

On the proposition of the President-Elect (Mr. C. E. Jones, of Chesterfield), seconded by Mr. W. Wells (Stamford), the following gentlemen were elected members of the Association: Mr. C. F. Cutting, of Downham Market; Mr. J. A. Fielding, of Waterbeach; Mr. F. Kent, of Worksop; Mr. H. Clark, of Maldon; and Mr. J. E. L. Hughes, of Uppingham.

Annual Report and Accounts.

The following report and the statement of accounts were then taken as read:—

Your Committee have pleasure in presenting their third annual report to the members of the Association, and express satisfaction at the progress made during the year. Two half-yearly general meetings have been held—the spring meeting at Lincoln, and the autumn meeting at Cambridge.

The number of members on the 1st of January, 1891, was 44. Eleven new members were elected during the year, and one member has resigned—leaving the number 54 as members on Jan. 1, 1892, which number the Committee hope will be largely increased during the current year.

The accounts show that the year began with £16 4s. 7d. in hand; and subscriptions amounting to £29 18s. were received—a total of £46 2s. 7d. The expenditure has been £38 12s. 7d., including the honorarium voted to the Hon. Secretary and Treasurer of £10 10s., leaving a balance in hand at the end of the year of £7 10s., and only two subscriptions outstanding.

At the spring meeting, the President (Mr. John Carter) delivered his Inaugural Address, which was of the greatest interest to the profession; and Mr. W. Barratt contributed a paper, "Some Thoughts on Gas-Meters," which was ably read by the author, and gave rise to a most interesting discussion. The members then adjourned, some visiting the Lincoln Cathedral, others Messrs. Robey and Co.'s, Limited, engineering works; all dining together in the evening at the Great Northern Hotel, Lincoln—amongst the visitors being the Mayor of Lincoln, Councillor W. T. Page, jun., Chairman of the Gas Committee, and J. Hepworth, Esq.

The autumn meeting of the Association was held in the Council Chamber, Cambridge, when papers were read by Mr. Fred Weller on "The Economical Working of a Small Gas-Works," and on "The Rating of Gas-Works" by Mr. F. A. Ward; also a discussion was inaugurated by Mr. C. E. Jones, on "Coal Storeage, viewed with regard to the Combination of the Mining Interests to the Detriment of the Gas Industry"—the whole being very ably discussed by the members generally.

The officers for the year 1892 were elected at this meeting as follows: President, Mr. C. E. Jones; Vice-President, Mr. W. Duesbury; Hon. Secretary and Treasurer, Mr. H. Wimhurst; Auditors, Mr. F. Weller and Mr. A. J. Yorston; Committee, Mr. W. J. Carpenter and Mr. J. H. Troughton. Upon the conclusion of the business portion of the meeting, the members visited many of the Cambridge Colleges, the FitzWilliam Museum, and the Gas-Works, and dined together in the evening at Y^e Old^e Castel Hotel; the

visitors including the Mayor of Cambridge, Alderman C. Balls, J.P., Chairman of the Cambridge Gas Company, and W. A. Valon, Esq.

The thanks of the Committee are due to those members who have contributed papers during the year; and the Committee hope that each member will undertake a similar task in the near future, and that each member will use his influence on behalf of the Association by inducing other gentlemen to join in the good work of the Association by becoming members.

The Retiring President.

Mr. Barratt said this finished Mr. Carter's term of office as President; and he had great pleasure in proposing a vote of thanks to him for the able way in which he had discharged the duties of the chair. Mr. Carter was younger than some of the members; but he had acted in an honourable and straightforward way, and the Association had lost nothing during the past year by having him at their head.

Mr. J. G. Hawkins (Spalding) seconded the motion, which was unanimously agreed to.

Mr. Carter said he could scarcely find words—certainly not adequate words—by which to express his sense of the too flattering terms in which Mr. Barratt had referred to him and to the work which it had been his duty and (he might say now that he was getting through the wood) his pleasure to perform during the past year. Their membership had increased; the meetings had been well supported; and they had been, he thought he was justified in saying, highly successful. Their thanks were due in the first place to those gentlemen who had contributed papers; and, secondly, to their Honorary Secretary for the able manner in which he had attended to the duties of his office. Mr. Wimhurst had had remarks similar to these made before with regard to his services; but when they remembered the warm, personal interest he took in his work, any recognition that they might make, either publicly or privately, would not at any rate be beyond the demands of the case. There was nothing left for him to do, but to vacate the chair, and allow the honours to fall into the more capable hands of his successor; and he trusted that, when Mr. Jones reached the end of his term of office, he would have the pleasure of looking back upon a year which had been as pleasant and successful as the one which had just closed.

Mr. Jones having taken the chair,

The Secretary read letters from the President of The Gas Institute (Mr. W. A. Valon, of Ramsgate), Mr. G. Garnett, of Ryde, and the Chairman of the Sleaford Local Board, expressing their regret at not being able to be present at the meeting.

President's Address.

The President said he appeared before the members that day under circumstances of considerable difficulty. Owing to the pressure of important professional engagements, he had not had time to write the whole of his address; so that a large part of it would be given extemporaneously. In the early portion of his remarks, the President observed that, although the efforts of gas managers in the main degree were, as might be supposed, chiefly directed towards devising methods for obtaining the largest yield of illuminating gas from a given quantity of raw material, and the most suitable and approved means of ensuring the proper application of the manufactured article, the production of secondary products on a large scale had given an impetus during the last half century to the science of chemistry of considerable importance, besides calling into existence new industries unknown before. Manufacturing chemistry had taken a new lease of usefulness since the introduction of coal gas. There was probably no other branch of manufacture which produced at one operation such a host of compounds as that of coal gas; and no source of chemical investigation had been so useful, and, let them hope, profitable, both to the manufacturing chemist and the general community. Gas-works were now recognized as the principal source of the ammoniacal salts of commerce; and it was difficult to conceive the inconvenience that would be caused by a diminution or cessation of their productive operations. Some of the most brilliant discoveries in chemical science in modern times were intimately associated with the gas industry; and the arts of war, as well as those of peace, had benefited by having substances at command so applicable to their various requirements. Medical and sanitary science also scrupled not to employ new sweetening and curative compounds or remedies; while the decorations of the home, and the bright and gaudy colours of wearing apparel, were indebted not to Tyre, but to coal tar, as the source of colouring material, and liquor furnished the agriculturist with a cheap and powerful fertilizer. Surely, it was a noble work to bring about these beneficial changes and boundless advantages for the good of mankind, and an honour to belong to such a profession as that which the gas industry had created.

In speaking next of the growth and popularity of the gas industry, the President referred to the statistical information which was furnished in detail to the Board of Trade. In 1882—the year of the Electric Lighting Act—there were, he pointed out, 458 authorized gas-works in the United Kingdom; and now the number was 594, or an increase of 136. The confidence of the public was shown by the capital invested in the undertakings. Of the £77,519,068 authorized, £61,344,357 had been expended, as against £60,577,736 authorized and £44,626,205 expended in 1882. During the same period, the number of tons of coal carbonized had advanced from 6,365,336 to 10,242,427; and the gas manufactured from 63,345,300,497 to 103,011,038,299 cubic feet, with distributory mains sufficient to "put a girdle round the earth." Comparing the production per ton of coal, in 1882 it was 9951·60 cubic feet; while last year it was 10,057·28 feet. This increase was important, since it would have required, to have made the total gas for 1891, 108,742 tons of coal more—the value being (say, at 10s. per ton) £54,371; or, roughly, £1000 per week had been saved by improved carbonizing. He confessed these figures, at first sight, appeared disappointing. With the many improved settings of retorts, gaseous firing, and more economical furnaces, it was not unreasonable to expect a better result; and the question arose, Have we reached the limit of the production per ton?

In considering this point, however, it should not be forgotten, remarked the President, that the average standard of illuminating power had been increased in this country; and it was no less a fact that, owing to the greater care exercised by the miner, a larger proportion of comparatively inferior coal was sold than formerly. To this it might be argued that cannel was used as an enricher of poor gas. This was true; but the use of cannel for the purpose named diminished as a knowledge of purification extended. They had only to reflect for a moment on the *rôle* played by carbonic acid gas, or the volatilization of the benzols or lighter oils by judicious condensing, to be assured of this. It was not by any means improbable that oil would, if necessary, usurp the place of the richer materials in gas making; and the growing scarcity of rich cannels must of necessity accelerate this result.

Reverting to the Board of Trade returns, the President said they were incomplete, and did not exhibit the full importance of the gas industry—either as regarded the number of gas-works, or the quantity of coal used therein. Thus in his own neighbourhood, there were more than twelve works not included in the returns at all; and no doubt this would be found to be the general experience. Again, the coal carbonized only was given; whereas there were large quantities of manufacturing fuel to be added to the total, in order to obtain an accurate idea of the gas coal trade. It was obvious that considerably more than 10,250,000 tons of coal per annum were absorbed in gas-works; and he was disposed to put it at 12,000,000 tons, which was something like one-fifteenth of the entire output of the United Kingdom. Of this enormous quantity of material, gas companies used two-thirds, and local authorities one-third; and it was interesting to note that, while the conversion of coal into gas went on augmenting, the price per 1000 cubic feet, as well as the net profit, exhibited a diminution. The President quoted a number of figures from some tables which he had prepared, and which partly illustrated this last statement. They exhibited a slight superiority for the undertakings not belonging to local authorities. The companies' returns for 1882 showed that 10,014 cubic feet of gas were made per ton of coal carbonized; and 9228 cubic feet were sold. The figures for the local authorities were respectively 9873 and 8983 cubic feet. In 1890, the companies' returns showed that 10,155 cubic feet of gas were produced per ton, and 9306 feet were sold; and in the case of the local authorities, 9877 cubic feet were made, and 9021 feet sold. In 1887, the net profit of the companies for every ton of coal carbonized was 9s. 11d., and on every 1000 cubic feet of gas sold 14·02d.; the figures for 1890 being 8s. 3d. and 10·67d. The corresponding figures in the case of the local authorities were: For 1882, 4s. 4¼d. and 5·79d.; for 1887, 2s. 11¼d. and 3·84d.; and for 1890, 2s. 6½d. and 3·35d.

There was another point, said the President, on which he wished to address the members. As they would have seen, the Board of Trade were again considering the question of the testing of gas; and it would have been observed that they were assisted by men in the gas profession. In all his life he had never seen such abject folly as had been displayed this year by the people in London. It was a mistake to rush after a standard which they could not possibly obtain, on account of the fact that it was impossible to measure accurately any light in the world. If they were going to get a standard of light, they could only do so in one way. He had been a worker in this particular direction; and he had endeavoured to determine the illuminating power of gas by its explosive properties. Mr. Thomas Newbigging had asked him to allow him to mention this matter; but he had refused, as he desired to thresh it out. This he had done; and he was prepared to say that there was not a single system in the world that could measure the illuminating power of gas like its explosive properties.

In concluding his address, Mr. Jones referred to the coal question. He said that of all the most wicked things he had ever heard of, and which had occurred in his own recollection, it was the present strike of the colliers. The gas industry purchased something like 12 million tons of coal a year for the purpose of producing gas. In the Act of Parliament of 1876, there was a clause which said that any man, or any set of men, who wished to put a town or district in darkness was liable to prosecution; and he asked whether the members did not think the colliers were now trying to put the whole country in darkness. If he had had time to have prepared his address, he should have said something very severe in reference to this action of the miners. The men had never been threatened with a strike; and, in his district at any rate, they had not been

asked to take less wages; but nevertheless they must "play." This matter was of the highest importance to the gas industry; but he had not said half as much upon it as he had intended to do.

Mr. BARRATT, in proposing a vote of thanks to the President for his address, observed that it was only the previous week that he visited him, and found him under the doctor's care, suffering from influenza. He did not expect to see him present at the meeting that day; and he was sure the members would sympathize with him in not having been able to deliver himself as he usually did.

Mr. A. DRAGE (East Dereham) seconded the proposition, which was unanimously agreed to.

Mr. J. H. TROUGHTON (Newmarket) then read the following paper, entitled

CONSUMERS' FITTINGS.

The subject I have chosen to bring before you is one which has not been discussed before by this Association; but it is constantly coming before us in our respective localities. Consequently it is nothing new; but I think it is of sufficient importance to give rise to a profitable and interesting discussion.

At one time it was considered by the majority of gas managers that, when a good supply of gas had been laid on to a customer's premises, and a meter of sufficient capacity for his requirements fixed, we had done all that was necessary so far as we were concerned; and the remaining and most important part of the work was left to the tender mercies of someone else, who might continue the good work we had begun, and give satisfaction, or who might continue the work and give general dissatisfaction, by putting in pipes utterly inadequate to convey sufficient gas to the various points of combustion—thus at once crabbing and crippling the supply we fondly hoped our customer would obtain.

Our efforts to satisfy our customers must always be more or less handicapped, while we labour under the disadvantages of having the internal fittings done by irresponsible tradesmen and unqualified fitters. We are too much in the hands of gas-fitters who are not up to their work, and who know little or nothing as to what are the sizes of pipes necessary to properly fit up a house. The fitter may be a moderate workman, but he lacks the idea; and it is astonishing what a volume of gas some of these fellows expect a ½-inch or ¾-inch pipe to convey. I have actually known a so-called "fitter" lead off from the outlet of a 50-light meter with a ½-inch pipe, intending it to supply sufficient gas for between 50 and 60 burners.

But it is not always the gas-fitter who causes us trouble, and our customers inconvenience. It sometimes occurs that architects are the cause of these reprehensible blunders; for they do not always specify pipes large enough for the number of burners required. I have had to condemn fittings for this reason, and to refuse to fix the meter until the defect was remedied. A fruitful source of mischief arises from contract work; for there are few things easier to be scamped than internal pipes. Then we have the "jerry-builder," who scamps everything, and the gas-fittings in particular; putting in the cheapest trash he can get, without the slightest consideration of quality or capacity—the work being abominably done. Next to his tenants, I think the gas manager is most to be pitied; for the result of the builder's short-sighted economy leads to dissatisfied customers, who are continually sending urgent requests for a fitter to stop some dangerous leak, or annoying us with complaints of insufficient light, and of "bad gas," which is generally produced by their own defective and shoddy fittings. These are a few of the many drawbacks we have to contend against; and to give in detail the many glaring and inexcusable blunders which undoubtedly exist to-day in almost every town supplied with gas, would be a waste of time, as we are all more or less acquainted with the causes I have mentioned. Fortunately, something has been done of late to remedy and guard against this unsatisfactory state of things; but there is a great deal more to be done before we can hope to dispose of the evils arising from defective and inadequate gas-fittings.

It has been said that the subject of internal fittings is beyond the province of the gas manager, and that we have quite enough responsibility without increasing it. With this I quite agree. But whether or not we are willing to accept this extra work, we shall have to submit, because it is being slowly but surely forced upon us; and I think the sooner we grapple with it, the more likely we are to come to some practical conclusion as to what is the best way to deal effectually with this important problem.

When we come to consider ways and means of surmounting and overcoming the many defects caused by leaving this work for others to do, we encounter obstacles at all points; for what would be a success at one place would not be practicable at another. Some companies undertake to fit up houses complete, supplying everything and charging cost price for the work done. Others have adopted the plan of doing the work complete on a three-years' system. The scheme introduced by Mr. Valon, at Ramsgate, seems to be a very successful one, and worthy of imitation. He told us at our Cambridge meeting, that, by fitting up houses of a rateable value of £30 and under free of charge, he had tapped a class of customer which only a similar plan would be likely to obtain. In return for free fittings, Mr. Valon charges 7d. per 1000 cubic feet over the rate charged to ordinary customers. This, it is estimated, will pay for the fittings in five years. They have at Ramsgate above 500 of these customers, who consume, on the average, about 10,000 cubic feet of gas per annum; and, being supplied on the prepayment system, no bad debts are incurred.

These schemes are very commendable, and steps in the right direction. But I fear they would be too difficult to carry out by many small companies in the Eastern Counties; for in the first place we should have the local gas-fitters to deal with, and this is no congenial task to set ourselves, because they already look with envy on gas companies, and the first move we make towards interfering with what they call their private business, would be looked upon as an encroachment, and in all probability strongly resented. Then small companies are not always so fortunately situated with regard to capital as larger companies and corporations may be. An extra skilled fitter would be required, whose wages would necessarily be high; and an additional workshop, and perhaps a show-room in the town, with an attendant, would be necessary; so that only large or medium-sized concerns can adopt these schemes with advantage. But we can all do something towards limiting, if we cannot over come, the many defects which from time to time come before our notice; and especially should we be alert at the present time, when we have so much competition to contend with in so many various forms. The electric light has not done us any harm in the Eastern Counties; and we need not look upon it as a very serious rival at present. But we have a far greater competitor in oil, which is extensively used not only as an illuminant, but for heating and other purposes. We have therefore every reason to be jealous of its presence among us; and nothing should be left undone until we can compete successfully with any rival which may cross our path, by adopting such plans as will tend to bring gas within the reach of all.

Something might be done at the outlet of the meter. It is here that the most important part of distribution commences; and I think it is here that we require some power or authority to fix upon, and adopt, a standard size of pipes suitable for dwellings and other buildings, so that, whether or not we undertake internal fitting work, we can at least see that our customers will have a system of pipes put into their premises which will ensure them obtaining a supply of gas at whatever point it may be required. The sanitary arrangements of new buildings are carefully looked after by inspectors; and unless pipes of suitable size and quality are laid, with a proper fall, and trapped to their entire satisfaction, they have power to condemn the whole system according to the law. Water companies, too, have similar powers; and I cannot see why gas companies should not have some additional facilities, to enable us to prevent the abuse of the light we manufacture and convey to our customers' dwellings, if not for their health, at least for their happiness and comfort. Personally, I should like to see our Association take up this matter, and adopt a standard of sizes, for (say) the skeleton part of the internal fittings of a house. I am confident much good would be the result, if only a united and persistent effort were made to carry it out when adopted; and I think we should be doing something which would help those of our members who, from no fault of their own, are unable to undertake the responsibility of doing the whole of this work, at the same time performing a duty we owe to our customers as well as to ourselves, which would tend very materially to popularize the use of gas, and diminish to some extent those annoying and irritating complaints which cause us so much trouble. If this were done, managers would be consulted more by present and intending customers, and be in a position to insist upon internal pipes of a proper capacity being put into their premises.

Some time ago the North British Association appointed a Special Committee to fix upon a standard size of pipes for internal fittings; and the result was that they recommended the following:—

Internal Diameter of Pipe. (Inches.)	Greatest Length of Pipe allowed. (Feet.)	Greatest Number of Burners for Size and Length of Pipe.
⅜	20	3
½	30	6
⅝	40	12
¾	50	20
1	70	35
1¼	100	60
1½	150	100
2	200	200

No. ½-inch pipe to be used.

I may say that at Newmarket I adopted these recommendations, with beneficial results. I had the scale printed, with other rules and information, in circular form, and distributed them among our customers; and whenever I see any buildings or alterations going on, I send a copy to the architect, builder, and owner, and have generally found that the information given has been acted upon. I can with confidence recommend the above scale to those who cannot do more than advise their customers on this subject. Where gas-stoves are used, or intended to be used, the internal diameter of the pipes should be at least ¼ inch larger; and in any case it is advisable to allow for them, for I have often lost the chance of placing both cooking and heating stoves, on account of the trouble which would be caused by enlarging the pipes, even when the work would have been done free. We let gas-cookers on hire at New-

market, and fix them free to customers who are willing to keep them a year, or we sell them and heating-stoves at a little above cost price. I cannot state the number of stoves we have in use; but during the summer months our day consumption of gas is as near as possible equal to the night consumption. With regard to tubing for internal fittings, that only of the best quality should be used. I prefer iron to lead or composition, as it is not liable to bend or to be nailed through.

There is also plenty of scope to improve upon the old-fashioned chandeliers and wall brackets which are still to be seen in our towns; and in fitting up new buildings, care should be taken to have these of good quality, and not altogether devoid of ornamentation, for they can be substantial as well as artistic, and are obtainable at very reasonable prices. With such a great variety of gas globes to select from, it is a difficult task to say which is best; but only those with large openings at the bottom should be recommended. Globes with narrow openings cause the light to flicker; and it would be well if these objectionable things were abolished. It is a mistake to have deeply tinted or painted globes, which often obstruct from 10 to 50 per cent. of the light. I prefer those which are nearly clear, though it is somewhat fashionable now-a-days, where the maximum of light is not the chief object in view, to have them deeply tinted. Of burners there are all sorts and conditions. Those of a corrodible material should never be used; yet it is strange that the "burner man," who still pays periodical visits to many of our towns, can find a ready sale for these antiquities, at very remunerative prices. I have known people pay 6d. to these men for the commonest burner imaginable; and, on account of the cost, prefer to use it in preference to a good governor burner given to them gratis. I strongly recommend the governor type, and always recommend burners of the best quality. I have found it a good policy to give samples away to any customer applying for them, as well as small boiling-stoves, and to send a fitter to fix them, and to attend to any little defect, free of charge. These little services tend to create a spirit of contentment amongst consumers, and cannot fail to do good.

There can be no doubt that the time has come for gas companies to take a greater interest in the distribution of gas beyond the meter, and those who do so will doubtless benefit both themselves and their consumers; and, with this object in view, at Newmarket we have decided to undertake the whole of the distribution from the meter to the point of consumption.

In conclusion, it is needless for me to say that I have not touched upon many of the details and little defects which are inseparably connected with this broad subject. But I do say that it deserves more attention than it usually gets; that we should exercise more supervision over consumers' fittings; and that we should no longer hesitate about tackling, in a systematic manner, what has been termed the greatest "bugbear" we have to contend against in the way of selling gas.

Discussion.

Mr. W. Duesbury said he was very pleased indeed with the paper; and there was a great deal of truth in most of the remarks made by the author. There was no doubt that it was a part of the duty of many gas companies to look after the internal fittings; but the one which he represented had rather neglected this matter in the past. They had, however, been going into it during the last year or two; but they had not fixed the sizes of the pipes to be used. He knew of one company that had defined a system of the kind mentioned in the paper; and it had worked very well, both for the consumers and the company. They had a certain size of pipe for a given number of lights; and they had authorized fitters. They compelled the fitters, before they authorized them, to say that they would keep to the rules, and anyone found disobeying them was not allowed to do fitting afterwards. He thought they might do more than had hitherto been done. They found that fitters and plumbers would sometimes interfere with the meters—would disconnect them, and so on; and this was a thing that no company should permit. Companies and corporations supplying gas should have the control of the pipes up to the meter; and to a certain extent up to the point of combustion.

Mr. Barratt said he was apprenticed to this particular business; and he had had considerable experience in it. He was very pleased that a member of the Association had taken up the subject; but there were a good many more things to be said in connection with it. In the first place, with regard to the specification drawn up by their Scotch brethren, he should like to ask what was the initial pressure given, because if they took a ¾-inch pipe up to a meter where they had a 2-inch pressure, the pipe was bound to deliver more gas than it would do if they had only 1, 1¼, or 1½ inch pressure. It followed, therefore, that they must themselves decide what ought to be done in each individual case; and to do this, they must know the pressure given both day and night. At Accrington, where he was before he went to Grantham, they possessed certain power in this matter; but they had infinite trouble before they could enforce it. A scale was drawn out in conjunction with one or two of the leading plumbers and gas-fitters of the place; and this was perhaps the best thing for a company to do. They not only gave the pressure in certain localities, but he fixed the sizes of the pipes that were to be used for a certain number of lights, and their weights per yard or foot as the case might be (they had there the supply of both gas and water). He also specified the kind of "back-knee" that was to be used. In the next place, he positively refused to allow a joint to be made with a copper-bit; and he maintained that, if they wished their gas-fitting done properly, all the joints should be made with a blowpipe. If they had no power in the matter of fittings, it was not much use having a scale, because the jerry builders would simply laugh at it. In Lancashire, where he was, a number of gas-fitters and plumbers were constantly kept going; and they had frequently large mills to supply with 1000 lights. They wrote out specifications for the mills and houses; and consequently everyone of them knew what he was going to tender for. The result was that more gas was consumed; and very few complaints were received at the office. In Grantham, he had a whole street in which the houses were supplied with three or four lights; and they had only ¾-inch pipes fitted. In consequence of this, they had more complaints from that street—by, he should think, five times over—than from any other. He told the landlords it was an utter impossibility for the tenants to have a proper supply of gas; and he had since put in ½ and ¾ inch pipes and three or four light meters, with very beneficial results.

Mr. Wimhurst said this question of fittings was one that he had taken a deep interest in for a long time past. In Sleaford his Company did the greater part of the fitting—at any rate, he might venture to say that they did 90 per cent. of it. In order to give the members an idea of what they had accomplished, he had culled a few figures from their accounts. The Company took up fitting work some 19 years ago; previously it had been done by local fitters. During the period mentioned, they had received for fitting no less a sum (for a small town of 5000 inhabitants) than £3346 5s. 3d.; and the expenditure had amounted to £2845 19s. 7d.—giving them a net profit of £500 5s. 8d., or an average of £26 6s. 7d. per annum. He believed the members would all agree with him that this was not an excessive profit, when it was remembered that they had to keep a stock of fittings of the value of £200. He had no doubt that the way in which they had done the work had to a large extent been the means of increasing the consumption of gas from 8 to 15 million cubic feet; and in the same period, the price of gas had been reduced from 6s. 5d. to 3s. 4½d. During the past eleven years, they had let out fittings; and there were now between 60 and 70 cooking-stoves on hire, but not many heating-stoves. The total rental received for these stoves had been £170 14s. 6d.; or an average of £15 10s. 5d. per annum. Besides, the stoves had largely increased the summer consumption of gas; and many consumers not only used them in the summer months, but during the winter as well. Regarding the kind of pipes to be used, he quite agreed with Mr. Troughton that iron pipes should be fixed where practicable. There were cases in which they were bound to put in composition piping; but if the sizes that Mr. Troughton had quoted were adopted by the consumers, it would be very advantageous both to them and to gas companies. He might say that in his own case he generally recommended the fixing of these sizes of pipes as near as possible. There was one thing he should like to suggest with regard to a remark made by Mr. Barratt as to the pressure. He (Mr. Wimhurst) took it that, when the North British Association framed their rules, they had the idea of decreasing the pressure, and thus save leakage. As to burners, he quite agreed that no burner should be employed except a governor; and respecting globes, he had a great preference for the opal "Comet" globe. These globes gave general satisfaction in Sleaford; and they had a large number in use.

Mr. J. Carter remarked that a few years ago, gas managers would have felt so secure in their position that, so long as they attended in a more or less perfunctory manner to putting in services and meters, they would have had little care afterwards as to what became of the consumer, so long as he paid his accounts regularly and did not make complaints. He took it that the additional interest which was now being shown in the consumers was an indication of the good that had been done by the actual and threatened competition of the last few years. One of the good results which the increasing use of oil and the threatened rivalry of the electric light had produced had been to create in gas managers an interest in the question of gas lighting, and perhaps a keener desire to see the gas more satisfactorily supplied, not only to the meter but to the point of combustion. He congratulated Mr. Troughton upon having what he presumed was the exceptional legal authority of refusing to fix a meter where the outlets did not meet with his approval; and he questioned whether many of the members were in that favourable position. The suggestion that gas managers should attend to the internal fittings was not made, if he understood rightly, so much for the profit that would be derived from the work, as to avoid subsequent complaints (which were often very numerous) arising from insufficient and inadequate fittings. If it could be done, this was the only way to avoid or minimize the complaints. The author's recommendations were such that they were applicable to some localities; while for others, they were not at all suitable. In a number of towns, the architects and plumbers were quite willing to carry out their work in harmony and in accordance with the wishes of the local gas manager. Where a feeling like this existed, it seemed to him that it would be altogether beyond the proper duties of a gas company to interfere with the internal fittings; and, in such a case, the first reason given by Mr. Troughton would not apply. Then

he suggested the prepayment system as a means of increasing the number of consumers. In some towns that would also apply; while in others it would not. In Lincoln, for instance, it would not. If he were to adopt Mr. Valon's method, he did not believe it would increase the number of consumers by 25 in the course of twelve months, as it was a custom with them not to build an artizan's or a factoryman's house without putting in fittings. Mr. Wimhurst agreed with Mr. Troughton that only iron pipes should be used for internal fittings. One of the advantages of a paper of this kind was that it brought out differences of opinion. Now, if it was left to his (Mr. Carter's) decision, he would say that not a single foot of iron pipe ought to be put in a house; and if he was fitting a house for himself, he should take care that a foot was not used.

Mr. W. J. Best (St. Ives) on the whole endorsed what Mr. Troughton had stated in his paper. There was no doubt, he said, that in many towns there were good gas-fitters; and at St. Ives they had one who, when he had to put in new pipes, invariably arranged the sizes with him. In many cases, when small cottage houses were being erected, the builder required the fitting done as cheaply as possible; and the result was that it was let out to tinmen or ironmongers. These people competed one against the other; and the result was they would do the work at a low price, and put in material of inferior quality. In many towns that he knew of, where the companies had taken up the fitting, it had been followed by very satisfactory results. Now that regenerative lamps had been introduced, he thought a little more attention should be paid to the question of pressure; and lamps of this class which were used for domestic lighting should be regulated by governors. In the case of the Bower, the Wenham, the Deimel, and other similar lamps, if the illuminating power of the gas was increased a little, they would at once begin to smoke; but this would be to a great extent prevented if they were properly governed.

Mr. Troughton, in replying on the discussion, said he was much obliged to the members for the manner in which they had dealt with the paper. Mr. Duesbury had referred to fitters being authorized; but this, he thought, was hardly practicable in towns where there were only one or two. Then Mr. Barratt had said something about the relation of the pressure to the sizes of pipes he had given. He could not say what pressure Scotch gas managers gave; but he could say that the scale of sizes applied very well at Newmarket, where they gave a pressure of about 15-10ths in the day time, and 25-10ths at night. His works were situated on a hill; so that they had to force the gas down to the town. He thought they were all practically unanimous that something should be done with regard to the sizes of the fittings from the meters. He purposely left out the question of chandeliers, brackets, and burners, as on these they all had their own individual opinions. Mr. Carter had said something in regard to the legality of refusing to fix a meter when the pipes did not meet with approval; but he evidently misunderstood him, as they had no legal powers of that kind at Newmarket.

The President observed that they had had a very interesting discussion, and a somewhat valuable paper; and he proposed that the thanks of the meeting be accorded to Mr. Troughton.

This was cordially agreed to; and Mr. Troughton briefly acknowledged the compliment.

Place of Next Meeting.

The next business was to fix the place at which to hold the autumnal meeting.

The Secretary announced that they had received an invitation to Lowestoft from their friend, Mr. J. Ayris, who stated that he would do his best to make the meeting a success. He had therefore much pleasure in moving that the next meeting be held in that town.

Mr. A. J. Yorston (Ely) seconded the motion, which was unanimously carried.

This concluded the general business; and later in the afternoon, the members and several friends dined together at the Bristol Arms Hotel.

Increase in the Price of Gas at Derby.—The Derby Gas Company give notice of an increase in the price of gas of 3d. per 1000 cubic feet.

Australasian Gas Association, Limited.—The Directors of this Association have declared an interim dividend of 7 per cent. per annum, free of income-tax, for the half year ending Dec. 31 last.

Sales of Shares.—At the Auction Mart, Tokenhouse Yard, last Wednesday, Messrs. Fox and Bousfield sold by auction a portion of a King's share and twelve new fully-paid £100 shares in the *New River Company*. The former was divided into nine lots, each consisting of the 120th part of an entire share; and of these three lots sold at £700 each, four at £690, and two at £670. The new shares were disposed of at £332 each.——On Monday evening last week, Mr. T. Bray sold at Pudsey, £70 of 10 per cent. stock of the *Drighlington and Gildersome Gas Company* for £126; £25 of similar stock, for £43 11s. 6d.; two 7 per cent. shares (£9 paid), for £13 4s. each, and one for £13 3s.——At a sale by auction at Camborne last Wednesday, five fully-paid shares in the *Camborne Gas Company* realized £5 5s. each, and five others produced £5 6s.——Mr. C. E. Taylor offered for sale at Shipley last Thursday £5000 of new ordinary 7 per cent. stock in the *Shipley Gas Company*. There was a large attendance, and the bidding was spirited. The shares were were offered in £100 lots, and found ready purchasers at prices varying from £154 to £157.

THE FOURNESS PROCESS OF GAS MAKING.

Reference has already been made in the Journal to the system of gas manufacture devised by Mr. H. Fourness, of Manchester; and in the number for Jan. 26 last (p. 159), we gave an illustrated description of the plant, abridged from the specification of the patent. The process has been reported upon by Mr. D. Fulton, Assoc. M. Inst. C. E.; and a few extracts from his report may be of interest, now that the question of establishing auxiliary water-gas appliances in gas-works is occupying the attention of managers.

The apparatus consists of a water-gas producer, with an oil vessel and syphon at the top for carburetting the water gas; the top of the producer being connected by tubing to three retorts, heated partly by the producer gas, but chiefly by a furnace at the foot of the brick setting containing the retorts. A small oil-supply pipe passes through the front of each retort; the oil flowing through a syphon leg from a supply-tank, and being carried by an extension of the pipe for a short distance along the interior of the retort. In making gas with this apparatus, the producer is filled with coke or other suitable broken material, and the furnace then lit and blown up until the coke becomes incandescent; the producer gas evolved helping to heat the retorts. The air-blast is then stopped; and steam from a suitable generator is sent into the lower part of the coke, in rising through which it becomes decomposed into water gas. Crude petroleum or other heavy and cheap oil is fed into the upper part of the producer, and is vaporized by the hot coke so as to mingle with the ascending gas. The mixture of water gas and heavy oil gas then passes from the top of the producer to the heated retorts; and at the same time a secondary supply of lighter oil enters at the front, and, becoming vaporized, further enriches the mixture from the producer. The enriched gas becomes fixed in the heated retorts, and then passes to the holder either directly or through purifiers, if these should be thought necessary. A special feature of the apparatus is the facilities afforded for preventing explosions in the producer and adjacent parts, which are not infrequent in carburetting appliances worked by heat. They usually occur when, the coke having become too cold to further decompose the steam, it is necessary to blow it again into a state of incandescence. The consequence of the sudden admission of air to the producer is to form an explosive mixture, which is quickly fired by the coke, and explodes, sometimes with disastrous effects. In the Fourness apparatus, when the coke is becoming too cold, the admission of the heavy oil at the top of the producer is first cut off. The admission of steam and the evolution of water gas, however, still go on, with the result that the water gas, in passing to the retorts, carries away from the producer all remaining traces of the heavy oil, or at least so reduces the quantity present that the dangerous or explosive elements are entirely removed from the producer. This passage of pure water gas into the retorts and holder would seriously impair the illuminating power of the gas, were it not that, in flowing through the retorts, the water gas picks up from the lighter oil, which is admitted to the front of the retort, sufficient oil vapour to maintain its illuminating power. But for the auxiliary oil-feed, this cleansing of the explosive vapours from the producer would hardly be practicable without considerable waste. With regard to the apparatus itself, Mr. Fulton says that, in its main features, there is nothing *per se* novel, except in matters of detail. What he considers to be novel—and what Mr. Fourness claims—consists broadly in the particular combination of parts he uses, and especially in the secondary oil-feeding tubes at the front of the retorts. Mr. Fulton inspected patent records extending over the last twenty years, and failed to find a specification which directly anticipates Mr. Fourness. He could not discover any patent in which an attempt was made to further enrich carburetted water gas by the additional vaporizing of finer oils in a heated retort, as in the Fourness apparatus.

Dr. C. A. Burghardt has lately inspected the plant on two occasions, and has expressed himself pleased with its simplicity and efficiency. On the second visit, he carried out a thorough test of it, as also of the illuminating power of the gas made thereby, and of the quality of the residual products. He says that he found the gas to be perfectly permanent, and of 21·5-candle power. The liquor resulting from the process consisted of very little tar, containing about 1½ per cent. of benzol. He is confident that no difficulty will be found in making with the apparatus gas of at least 22-candle power with 3½ gallons of oil per 1000 cubic feet; and this quantity of gas could, he believes, be produced at the cost of about 1s. Of course, the gas manufactured by the Fourness process has to be purified like ordinary coal gas.

The Fatal Gas Explosion at Blackburn.—At the Manchester Assizes, last Wednesday, the Grand Jury threw out the bill in the case of Mark Robinson and Francis Robinson, indicted for the manslaughter of Eleanor Buckley, at Blackburn, on Nov. 30 last. It will be remembered that, by removing a large gas-meter in the cellar of the Crown Hotel in Blackburn, the accused caused a serious escape of gas; and by the explosion which followed, the house was wrecked, and Mrs. Buckley and other persons were killed and several were injured.

REGISTER OF PATENTS.

In future the prices of the specifications will be omitted, as a uniform charge of 8d. each has been adopted by the Patent Office. Copies of specifications will be supplied from the Sale Branch, 38, Cursitor Street, Chancery Lane; or through the post by means of a form of application purchasable for the above amount at the principal Post Offices in the United Kingdom.

Governing Gas-Engines.—Griffin, S., of Bath. No. 4535; March 13, 1891.

This invention relates to means for governing the supply of working charges to the motor cylinder of gas-engines, as also the discharge of the exhaust gases from the cylinder; and it has special reference to the arrangement described in patent No. 19,962 of 1890.

The inlet and exhaust valves (advantageously of the mitre type) are arranged either in one casing or separately; being connected with the motor cylinder and actuated by suitable cams and levers or other devices in any convenient manner. The valves are held down on their seatings by springs of sufficient strength to resist any partial vacuum that may be formed by the action of the piston in the motor cylinder; and they are simultaneously thrown into and out of gear with the cams and levers, or other device which actuates them, by means of suitable mechanism actuated by the governors. The admission of combustible gas for forming the working charge is advantageously controlled by the inlet-valve, for which purpose, according to one arrangement, any number of small holes are made on the seating of the inlet-valve, and in communication with the gas supply. The supply of both air and gas are thus simultaneously controlled by the valve.

The operation is as follows: When the engine is running at or below its normal speed, the mechanism in connection with the governor holds the inlet or exhaust valves in gear with the cams and levers or other device, so that the necessary motion for controlling the inlet of the charge of gas and air, as well as the exhaust, is given them. When the normal speed of the engine is exceeded, the governor will interrupt the action of the valves, which will now remain stationary on their seatings, and so prevent ingress or egress of gas or air until the normal velocity of the engine is again reached. It will thus be obvious that, during the light running of the engine, the negative work of continuously charging and exhausting the motor cylinder with air (as is usual) is entirely avoided; considerable gain in economy and power being the result, and also saving in wear and tear.

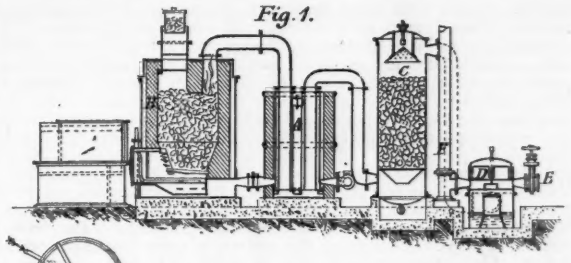
Ignition Apparatus for Gas-Engines.—Cooper, E. W., of Coventry. No. 4771; March 17, 1891.

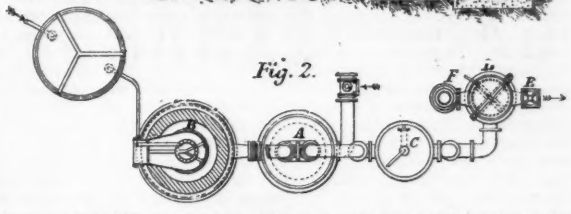
According to this invention, instead of the ordinary ignition-tube, a "nozzle" is provided of any suitable material and shape, having a passage running from its base upwards, or to the part to be heated, and then turning back again, or being conducted away from the deleterious action of the gas-jet, and terminating in, or forming, a suitable chamber of sufficient capacity to hold the incombustible gas or gases. Such a chamber may form part of the nozzle, or may be made separately, and attached to it by any suitable means. This arrangement of igniter, it is claimed, will ensure the reduction to a minimum of the part affected by the gas-jet, and at the same time facilitate the disposal of the "dead" gases. Greater duration of the life of the igniter, and more certain ignition—in other words, economy and efficiency—are also claimed for it.

Gas-Generators for Motor Engines.—Boult, A. J.; communicated from the Compagnie des Fonderies et Forges de l'Horme and A. Lencauchez, of Paris. No. 4798; March 17, 1891.

Gas motors, it is remarked in the specification of this invention, have at the present time attained a very high degree of perfection; deriving, as they do, a much greater amount of motive power from a unit of heat than the best steam-engines. Hitherto, however, gas-engines have more frequently been operated by gas obtained by the distillation of "gas coal," than by other combustible gases, capable, when mixed with atmospheric air, of forming the required explosive. Such ordinary lighting gas, while it is convenient enough in cities, where it can readily be procured, becomes very expensive where a sufficient supply is required for powerful engines, and is to be paid for at the usual rates, while outside a certain radius no gas is obtainable at all. "It is therefore of the greatest importance that both excessive costliness and scarcity of ordinary gas should be provided against by the discovery of a suitable substitute for the same." It has long been a well-known fact that the gas yielded by existing works, becomes capable of feeding motor engines the moment its calorific power exceeds 1200 units of heat per cubic metre; and as, in practice, it is possible, by means of good apparatus, to produce 1300 and even 1350 units of heat with the worst fuel, and as many as 1500 units with choice fuel, it is desirable that gas generators should be so constructed as to supply as rich gas as possible. For this purpose, the patentees have devised certain novel devices and combinations, the most important of which are described by them with the aid of the accompanying diagram—a vertical section and a plan of the proposed plant.

Air, after passing through a small regulating valve or dome, is caused to enter a superheater A. This is a tubular apparatus, in which the hot-air tubes may or may not be provided with wings, according to the importance of the generator B. It receives the heat from the gas (which issues from the generator at a temperature of about 600° to 800° C.) before such gas passes into the lixiviating or purifying apparatus C. In passing through the superheater, the gas therefore yields part of its available heat to the air-blast, thereby warming it to a temperature of about 200° to 300° C. From the superheater, the air (after being thus heated) enters the hollow base of a special arrangement presently to be described, upon which is erected the generator. This base is filled with hot water supplied from the cylinder of the engine. By coming into contact with this water, the air becomes saturated with it and superheated, whereupon it flows through the generator B, and is converted into rich gas. The gas thus produced passes on into the superheater A, and then into the purifier C. This latter apparatus consists of a column of coke moistened by a continuous





shower of cooled water. The coke it contains should be finer the nearer it is to its top. This purifying apparatus is provided with a perforated conical distributor, arranged to spread water evenly all over the filtering surface. Similarly to what takes place in an ordinary apparatus of this kind, the water and gas move respectively in oppotite directions, whereby thorough lixiviation and a gradual and methodical cooling are ensured. From this purifier the gas escapes into a distributor D, provided with a valve or trap, which enables the required amount of gas to be supplied to a gasholder through a sluice-valve E, or discharged into a chimney F during the short periods of lighting and cleaning. This gas feeder may be replaced, if desired, by valves or any apparatus adapted to reverse the course of the gas.

The characteristic features of a gas plant for motor engines such as is here sketched out are as follows: (1) The means employed for saturating the air under pressure with steam and superheating it. (2) The means employed for supplying the generator with gas under pressure, so as to store up gas for the renewal of the operation after the period of rest, or when the grate loses somewhat its brightness, as it is apt to do from time to time in consequence of the cooling which results from the decomposition of the steam or through any other cause. (3) The means employed for controlling the air-blast.

In regard to the first of these three features, it will be seen that the gas generator proper B is erected upon a hollow base containing the ash-pit. This base forms around the ash-pan an annular basin or jacket, the water-level in which is kept constant by a suitable overflow cock or valve. The water, being discharged from the cylinder of the engine (and the temperature of which is about 65° C.), is first conducted by a pipe to the upper part of the grate within which is a head-piece forming a distributing reservoir, from which it subsequently flows in the condition of spray into the ash-pan, after having cooled the metallic portions of the grate. The hot water falling into the ash-pan passes through openings in the latter into the annular jacket. In this jacket the air under pressure, having already been heated by contact with the heater A, is introduced into a conduit; and as it flows in contact with the surface of the heated water contained in the jacket, the air becomes saturated with the water and superheated. The mixture of hot air and superheated steam which passes through the generator in so doing, is converted into combustible gas rich in hydrogen.

Turning to the second feature above mentioned, it sometimes happens that, in consequence of the units of heat necessary for the decomposition of the mixture of steam and air being consumed, the grate is found to lose its brightness to a certain extent. To enable it to recover this brightness, and to make the fuel in this part of the furnace red-hot throughout, a gas coil or ring-burner is arranged so as to receive gas under a pressure higher than that of the gasholder or that of the blast underneath the grate. This ring is then lighted and instantly develops heat capable of rendering the grate and fuel incandescent in a few minutes, without stopping either the supply of air or the operation of the engine. In order to feed the ring or coil with gas, there is arranged at G a small storeage holder similar to one used in laboratories, which is besides surmounted by a vessel which may be filled with any desired quantity of water and evacuated wholly or partly by means of suitable cocks. When this vessel is emptied, gas from the gasholder is introduced into it, which, upon raising the dome, fills the apparatus. When it is filled with combustible gas, the gas-inlet cock, is turned off and the water-inlet cock is opened. Water will then fill the vessel, and the dome be charged to a higher degree of pressure than that existing in the main holder. The dome or auxiliary holder being thus charged, the cock of the ring or coil is turned on, and the gas lighted underneath the grate, so as to keep up the red heat, and accelerate the production of operative gas in the generator B. When the operation has been stopped for a certain time, the filling of the secondary gasholder G may be repeated, if necessary, two or three times, in order to supply the gas for brightening up the grate of the generator.

Referring to the third point, the means used for controlling the supply of air under pressure consist of a dome provided with window-like apertures, and adjustable by means of a rod in a tube or sleeve, which forms a branch of the main-pipe. By raising this dome, one or more of the apertures are exposed, thereby enabling the air-blast to pass through; its pressure by these means being regulated to any desired extent.

Manufacturing Illuminating Gas.—Munns, W. H.; communicated from E. De Beauharnais, of New Bedford (Mass.), U.S.A. No. 5212; March 24, 1891.

The claim for this invention is for a process of manufacturing illuminating gas, which consists in treating petroleum by passing it through wood-ashes and ground corn-cobs, highly heating the oil so

treated, together with water, steam, and air, in a retort, and passing the resulting gases through a filtrant saturated with refined petroleum.

In the words of the patentee: In the practice of my invention, I first take a quantity of crude petroleum, and treat it with a vegetable compound consisting of ground corn-cobs mixed with a small quantity of ashes made from the wood and bark of the white-ash tree. Thus, for example, take one bushel of ground corn-cobs, and place it in a hollow perforated copper cylinder or receptacle made of wire or of thin copper sheets finely perforated. This retaining cylinder is set in a second cylinder or receptacle made of wood. To each bushel of prepared cobs, I add not more than one pint of the ashes, spreading it on the top of the cobs. A concave perforated cover is placed on the top of the retaining cylinder; and into the cover the crude petroleum is thrown and allowed to drip down through the perforations on to the compound below. About one bushel of cobs is sufficient to treat one barrel of petroleum. To get good results, the oil should be left in contact with the compound about 24 hours. Just what the chemical effect of this treatment is, I have not been able to determine; but I do know that the result of the treatment is a very superior illuminating gas. The crude petroleum having been treated as aforesaid and mixed with rain water, the operation of mixing the gas is as follows: After the fire has been laid, and the retort brought up to the required temperature—say, 1500° Fahr.—heated air is admitted through a tube, and the prepared petroleum and rain water are passed in by means of other tubes; and the steam generated outside of the retort is admitted through another tube. These ingredients are converted into gas in the retort, whence it is led into the reservoir. In one limb of the retort, is a return-tube; and the gas is therein superheated before it escapes to the reservoir. The water and petroleum are converted into steam and hydrocarbon vapour in the one limb of the retort, and there combined; and the steam generated outside of the retort is introduced into the opposite end of the other limb, and projected towards the outlet; so that while at the same time the gas is generated, mingled, and combined, it is accelerated in its passage from the retort by the current. In this connection I desire to state that, by repeated tests, I have ascertained that, by introducing water and steam into the retort along with the petroleum, as above described, instead of introducing steam alone, a large quantity of fixed gas of superior quality is produced. In this operation, a part of the waste heat is utilized in converting water into steam. A portion of this steam is forced into the retort through a tube; and part is utilized in working the piston supplying power to the blower, which is employed in forcing heated air through one of the tubes, and for increasing the draught of the furnace, if that be desired, in any ordinary way. After the gas has been thus generated and collected into the reservoir, it is passed through a tank containing the refined petroleum and sponges, by which it is greatly enriched; and all foreign particles are removed from it before it passes into the burners and by which the clogging and choking of the burners is avoided. When the gas is to be employed for any ordinary illuminating or heating purposes, it is not desirable to highly charge it with hydrocarbon, as above explained; and in that case the sponge-box already described is employed merely to free the gas of foreign particles floating in it—the sponges in that case not being saturated with oil, in which case the clogging or choking of the burners is prevented, and a gas is produced which will not emit sparks in burning. In the manufacture of illuminating gas from the ingredients, and in the manner above described, an illuminating gas is produced that, for all practical purposes in the use of such gas, I have found to be non-explosive, non-asphyxiating, sanitary, and not even injurious to the life of delicate house-plants.

Gas-Engine Bags and their Valves.—Lanchester, F. W., of Bedford Row, London. No. 5226; March 24, 1891.

This invention—relating to improvements in the valve arrangements and other details of gas-bags for gas-engines—is intended to perfect the action of such bags so as "to obviate more completely than hitherto the fluctuations of pressure in the gas-pipes supplying gas-engines."

In one mode of carrying the invention into effect, a metal ring or cylinder (of considerable diameter compared with its length) is arranged with both sides closed with rubber or other diaphragms attached to the metal cylinder, which also carries the gas inlet and outlet pipes and has the two rubber sides forming the gas-bag. To the upper interior part of the metal ring or cylinder, stirrups or staples are attached, and from them are suspended strips of leather or other flexible material in such manner as to form a loop (double or treble) hanging towards or below the centre of the cylindrical bag. It is attached to the rubber sides, at or near the centre of the circle, by plates and rivets above the lower end of the suspended loop. In the opening leading into the gas-bag, a loose conical plug or valve is placed, constructed of light sheet metal or preferably of wood; and this is supported by a light rod resting in the end of the suspended loop, the end being attached by an eyelet, cord, or wire. The length of the rod is so proportioned that, when the flexible sides of the bag are flat, because of the absence of excess pressure of gas, the loop hangs in such a position that the valve allows very free access from the supply-pipe. If the suction from the engine causes the sides to bulge inwards, or become concave, the loop is in its most extended position, and the valve is full open. When the gas pressure distends the flexible sides, the loop is pulled up, and acts like a toggle linkage on the rod controlling the gas-inlet valve, and so closes it or diminishes the inlet area to a greater or less extent. The valve thus opens more or less as the bag requires more or less gas to supply it, as determined by the requirements of the engine.

Regenerative Gas-Stoves.—Siemens, F., of Queen Anne's Gate, Westminster. No. 5907; April 6, 1891.

This invention relates to a regenerative gas-stove in which light and heat radiated from open gas-flames are reflected, and air is heated by contact with the surfaces of the reflector and passages for the products of combustion, part of this air going to supply the flames.

Fig. 1 shows vertical sections, at right angles to each other, of one form of the stove; fig. 2, similar sections of a stove with extended air-heating flue surface.

A is a horizontal gas-pipe, which may extend across the whole width

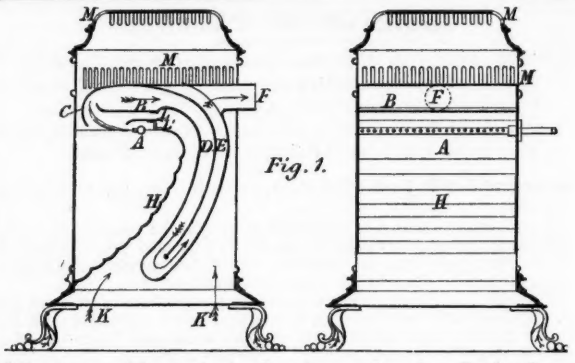


Fig. 1.

of the stove, and has projecting from it a number of small tubes forming a flame or a row of flames directed horizontally under a plate B. The products of combustion pass up in front of the edge of this plate, and behind a downwardly projecting flange C, which may either conceal the flames and prevent them being seen in front of the stove, or may be arranged with glass, ceramic material, or mica, to transmit more or less of the light. The products of combustion pass over the plate B, then descend a passage D, and ascend E, as indicated by the arrows, and proceed to a flue F, either directly as in fig. 1, or after passing through a helical flue G as shown in fig. 2. In front of the passages D E is fixed a concave reflector H, preferably of corrugated copper polished, so that light and heat radiated from the flames above are reflected by it into the apartment. Fresh air, entering by apertures K at the bottom, ascends within the stove, and becomes heated by contact with the external surfaces of the flue D, and the internal surface of the reflector H. The air thus heated passes through openings L L¹ to supply the flame on its upper side; the lower side of the flame receiving a supply of air more or less heated by ascending in front of the reflector. Fresh air also enters by apertures K¹ at the bottom, and, rising within the stove, becomes heated by contact with the flue E, and issues into the chamber through apertures M in the upper part of the stove.

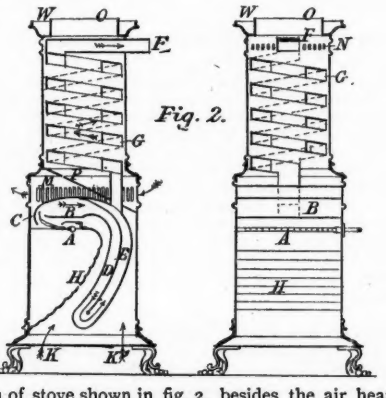


Fig. 2.

In the form of stove shown in fig. 2, besides the air heated in the lower part, additional air, entering the upper part by some of the perforations M above a partition P, is heated by passing along the surface of the helical flue G; and it then issues, by apertures N or by an opening O, at the top of the stove. W is a trough for water to supply vapour for moistening the heated air; and a similar trough may be arranged in connection with the stove shown in fig. 1.

Retort-Charging Devices.—Hardman, J., and Peake, J., of Tunstall. No. 6159; April 10, 1891.

In carrying out this invention—which relates to a hopper adapted to travel on rails above the retorts, and capable of being raised or lowered according to the varying heights of the different retorts—the patentees construct a travelling framework, provided with flanged wheels to suit the rails; and in this framework the hopper is adapted to be raised or lowered, and is preferably carried between vertical V-shaped or other guides, which guide it in its up and down movement. Upon a suitable portion of the hopper are pulleys; and upon the framework, are preferably two chains, each secured at one end to the framework, and adapted to pass round pulleys to a winch apparatus upon the framework, so that by winding up or unwinding the chains, the hopper will be raised or lowered.

The engraving shows a side and end elevation of the arrangement in question.

A is a rigid frame, the lower portion of which is formed of channel-irons at its sides and angle-irons at its ends. It is mounted on wheels or rollers B; and the upper part is also formed of angle-iron, and secured to the lower part by angle-iron standards, the tie-bars (one at each side of the frame) also serving to stiffen the structure.

There are vertical angle-iron guides secured to the upper and lower frames by blocks or shoes; and these extend down below the frame. C is the hopper, the lower part of which may be circular or (as shown) with parallel sides and semi-circular ends; and the upper conical part at its mouth is surrounded by an angle-iron frame. A slide or valve is provided at the junction of the upper and lower parts of the hopper, operated by a lever D, pivoted to a bracket secured to the lower part of the hopper. E are two pulleys mounted one on each side of the upper part of the hopper; and F are two similar pulleys on brackets secured to frame A. G are two chains, each fastened at one end to one of the standards, and each of which passes under one of the pulleys E, and over one of the pulleys F, and thence to one of the drums H of the

Fig. 1.

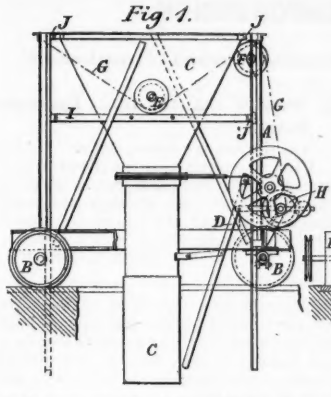
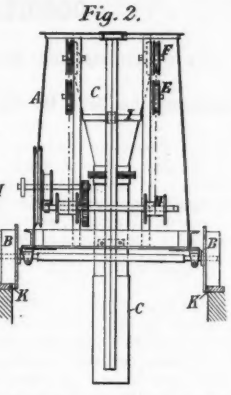


Fig. 2.



winch apparatus, both drums being secured on the same shaft. A wheel is provided, round which passes an endless rope or chain for operating the winch apparatus; and a similar wheel receives the rope or chain by which the whole apparatus may be moved from place to place by causing the rotation of the wheels or rollers B. I is a band secured to the taper part of the hopper C; and at its ends, it is provided with blocks J, which work in the angle-iron guides; similar blocks J being fitted to the ring at the upper part of the hopper C. There is a brake-lever on the winch apparatus, by which the descent of the hopper may be checked at any desired part.

Gas-Burners.—Röher, R., of Tena, Germany. No. 9442; June 3, 1891.

This invention relates to improvements in gas-burners whereby, whenever the inflow of gas is increased or reduced, a corresponding increase or reduction is effected in the inflow of air; while in the case of burners having several jets, the number of jets which are required to burn can be determined by merely turning the base of the device. The invention is described as applied to a Bunsen burner; but it is likewise applicable to any sort of burner.

The base of the burner is provided with a plug furnished with four openings, serving to supply the various jets with gas and air. Upon the plug is mounted a casing, divided by a partition into three gas chambers below, and an equal number of air chambers above. Three tubes or inner burners are screwed in the top casing, and communicate with the gas and air chambers. Each air chamber has two air-inlets, which can be more or less opened and closed by a circular valve, furnished with corresponding openings, and with three teeth upon its outer periphery, gearing with a toothed segment arranged at the upper part of the gas-inlet tube. These three teeth act as stops to prevent the plug in the inlet tube from being turned on too far. Thus, at the same time as the inflow of gas is regulated, the opening of the air-inlet is also correspondingly regulated; and owing to each flame having its own air chamber, the introduction of air from the unused or closed burner is prevented. The air chambers are closed at the top by a suitable cover.

Non-Regenerative Gas-Lamps.—Harrison, T. B., and Hudson, G. W. S., of Armley, near Leeds. No. 14,961; Sept. 4, 1891.

The patentees, in their specification, point out that in non-regenerative gas-lamps the burners are usually arranged around a bulb or chamber, from which they derive the gas at about 45° from the vertical; the heat from the burners ascending and striking upon the under edge or surface of a superposed basin-shaped dome or deflector. According to their "improvements," above the burners is a dome or deflector with a cover or canopy above, separated from it sufficiently to allow a passage for the escape of the products of combustion to a ventilating or exhaust shaft; a fan being arranged at the top of the ventilating opening for exhaust purposes. The deflector is of mushroom shape; having a turned-up rim or flange, and perforated for ventilating purposes, and likewise in order to prevent the formation of any carbon deposits thereon.

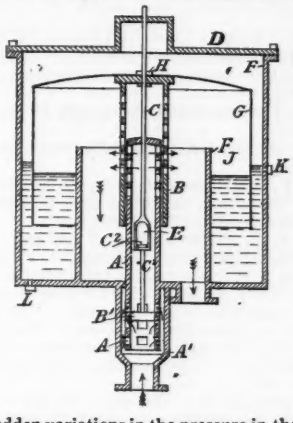
Another part of the "invention" consists in a special construction of joint for suspending such lamps in workshops, &c. The pipe union at its top end is provided with a swivelling joint, similar to a ball-and-socket joint, which allows considerable freedom of motion; the union at the lower end being provided with a pivot, which fits into a recess upon a bracket secured to woodwork, while other brackets are em ployed for holding the union at the required parts.

Gas-Pressure Regulator.—Fleischer, J., of Frankfort-on-the-Main, Germany. No. 16,326; Sept. 25, 1891.

The object of this invention is to construct a gas-regulator, in which the disadvantages accruing from the accidental sinking of the fluid level in the regulator, are obviated. These disadvantages, according to the patentee, are as follows: (1) Gas can escape into the room in which the regulator is standing; (2) the gas-flames are entirely or partially extinguished; (3) in the case of gas-motors, stoppage is often caused owing to the gas-feed being cut off; (4) the regulator fluid is often sucked out into the service.

In the engraving, F is the exterior casing of the regulator, into which the fluid is placed, and which is provided with the interior cylindrical part I and cover D. G is the regulator bell, having attached to it the perforated tube B, sliding on the interior perforated tube A, which is preferably cast in one piece with the outer regulator casing. The interior tube is provided at its lower end with perforations, while the lower end of the tube B is full. The two tubes A and B also vertically guide the regulator-bell. Inside A, a piston-valve B^1 is arranged to slide vertically by means of its rod C^1, jointed to the upper rod C, which is attached to the bell G. The two rods C C^1 are so joined as to allow a certain amount of play; C^1 being provided with a button C^2 embraced by the fork or stirrup E of the rod C, which latter extends through the cover D. The bell may be weighted by means of weights H.

The apparatus works in the following manner: Gas enters at the inlet A^1, and passes in the direction of the arrows through the lower perforations of the tube A, rising therein, and passing out through the perforations of A and B into the interior of the bell G, and thence to the outlet. If now the pressure in G increases, the bell will be raised; and as the lower part of the tube B is not perforated, the gas-inlet will be gradually closed. The gas in the bell can be used up, however, to a certain small extent, without varying the inlet, owing to the play of the button C^2 in the stirrup E. This arrangement has the additional



advantage that sudden variations in the pressure in the service, and consequent jumping and bobbing of the gas-flames, are avoided. As soon, however, as the consumption of gas increases for any length of time, the bell sinks, and so increases the gas-inlets through the tubes A and B, owing to the depression of the piston B^1 opening up more of the lower perforations of A. This arrangement of the perforated tubes A and B and piston B^1 allows for a very sensitive regulation of the gas pressure.

Gas-Burners.—Bayley, H., of Walsall. No. 21,252; Dec. 5, 1891.

This invention relates to gas-burners for use alternatively for intermittent heating purposes and for lighting, such as are described in Lavender's patent, No. 2198 of 1890; and it has for its object an improved description of valve mechanism for use with such burners, and improved means for use in opening and keeping open the passage-way for gas when the burners are to be used for lighting. This arrangement consists of a weighted arm capable of being moved to opposite sides of its pivoted centre, with an arm fixed to turn therewith, and formed so that, when the weighted arm is turned over in one direction, the other arm operates to open the valve, and allow a full supply of gas to pass, and when turned back again the other arm allows the valve to close sufficiently to cut off the main flow of gas.

Valve Gear for Engines.—Miller, J. J., of Hammersmith. No. 21,529 Dec. 9, 1891.

This invention has reference to means for operating the exhaust-valves of gas and other engines having a multiple-stroke cycle. In one arrangement, suitable for an engine having a four-stroke cycle, the exhaust-valve is operated by a cam fixed on the crank-shaft of the engine, and formed with a cylindrical extension, around which and the cam proper extends an endless groove, into which takes a pin or one end of a rod or lever connected to, or arranged to work in conjunction with, the exhaust-valve. The arrangement is such that, during three successive half revolutions of the crank-shaft, the exhaust-valve will remain at rest; but during the fourth half revolution, or the greater part thereof, it will be held open by the action of the cam upon the pin, rod, or lever.

Manufacture of Gas.—Fairweather, W.; communicated from the Acme Liquid Fuel Company, of New York. No. 21,881; Dec. 15, 1891.

The object of this invention is to produce a fixed gas, for heating or illuminating purposes, from hydrocarbons, from hydrocarbons and water or steam, or from hydrocarbons and hydrogen, by apparatus which may be adapted to furnaces of ordinary construction, with but little, if any, modification, or which may be used in connection with the special form of furnace designed for the purpose.

Many attempts have been made, say the inventors, to produce a fixed gas from hydrocarbons, or from hydrocarbons and water or steam, by various processes and forms of apparatus; but, so far as is known, with only partial success. This want of success has resulted principally from defects in the apparatus employed and in the methods pursued. Under the Acme process, the gas may be formed from hydrocarbons alone, after which atmospheric air may be mingled therewith, if desired, in any known manner and in any desired quantity; or after the hydrocarbons have been converted into a fixed gas, and while superheated to a high degree, gas formed from highly-superheated steam may be mingled with such superheated hydrocarbon gas, thereby producing a gas possessing the necessary qualities for heating or illuminating, as may be desired. Or hydrogen, or a gas consisting largely of hydrogen, may be mingled with the vapour of the hydrocarbons, and be superheated therewith.

The purposes for which the gas is intended will govern to some extent the amount of steam employed in the process, or the quantity of hydrogen or atmospheric air used. When the gas is intended for heating, the bulk of steam product, of hydrogen, or of air, is increased or decreased as may be desired, as the greater the steam product or the hydrogen, the greater the heat produced; and the heat and light giving

qualities of the gas may be regulated in this manner by simply increasing or diminishing the proportion of steam, hydrogen, or air employed in its manufacture.

The process and apparatus for producing gas from hydrocarbons alone is first described in a lengthy specification, accompanied by four sheets of drawings; then the modification of the process and apparatus by which the gas is produced from hydrocarbons and water or steam; and then the modification of the process and apparatus by which hydrogen is mingled with the vapour of the hydrocarbons, and superheated therewith. There are no less than fifty "claims" for the invention.

APPLICATIONS FOR LETTERS PATENT.

3935.—Lewis, J., "Regenerative gas-lamps." Feb. 29.
3958.—Johnson, J., "Gas-burners." A communication from Hugh Kennedy. March 1.
3964.—Heydon, J., "Regulating the supply of gas to gas-engines." March 1.
3973.—White, D. D., "Automatically controlled gas-light extinguisher." March 1.
3981.—Addie, J., and Cuningham, J., "Treating blast-furnace, illuminating, and other gases, and spent lime and gas liquors, for the recovery of cyanides therefrom." March 1.
3995.—Boult, A. J., "Manufacture of fuel gas." A communication from the Chicago Heat Storeage Company. March 1.
4032.—Osbourn, T. R., "Quenching coke." March 1.
4041.—M'Dougall, J. S. and J. T., "Treating mineral oils or spirits to facilitate the manufacture of gas therefrom." March 1.
4183.—Darwin, H., "Gas heating-stoves." March 3.
4189.—Hamilton, J. H., "Gas motor engines." March 3.
4206.—Holloway, J. E., "Regenerative gas-lamp or gas-burner." March 3.
4210.—Lanchester, F. W., "Gas-engine details." March 3.
4241.—Ferrie, P. D., and Thiroux, H. J. B., "Enriching ordinary gas by means of naphthalene." March 3.
4369.—Rudd, J., "Combination economic gas-light." March 5.
4374.—Lanchester, F. W., "Gas and petroleum engines." March 5.
4465.—Griffiths, W. B., and Woodley, J., "Pumping air, gas, and other fluids." March 7.
4610.—Pinkham, G. F., "Electric gas-lighting burners." March 8.
4679.—Smith, W. E., and M'Murtrie, J. M'L., "Burning petroleum and other liquid hydrocarbons for heating and lighting purposes." March 9.
4728.—Moeller, J., "Making gas from oils, fatty substances, and other material." March 10.
4736.—Dougill, J., "Gas motor engines." March 10.
4855.—Clinch-Jones, F. J., "Gas-engines." March 11.
4907.—Lee, J., and Lancaster, S., "Producing an atmospheric or Bunsen smokeless flame from liquid hydrocarbons as fuel." March 12.
4922.—Lee, J., and Lancaster, S., "Continuous manufacture of oil gas for domestic and general illuminating and heating purposes or for motive power." March 12.

The Eccup Reservoir of the Leeds Corporation.—The Water Committee of the Leeds Corporation last Tuesday paid a special visit to the works now in progress at the Eccup reservoir. The Engineer (Mr. T. Hewson) explained to the party that the trench had now been excavated to a depth of 164 feet for a distance of 426 feet; and he was of opinion that the Committee should inspect the bottom and works generally before commencing to replace the puddle. In pointing out the difficulties that had been met with, he stated that, from a depth of 100 feet to 120 feet, a huge wall of cement had been found running along the centre of, and in several places across, the puddle wall. The presence of this cement wall clearly indicated that the puddle-wall had been completely ruptured, and left with immense fissures in it, which had been filled with cement flowing into them from the bore-holes put down in a previous attempt made to cure the leak; and that, at a depth of 130 feet, there was found a hole some 2 feet square running right through the puddle-wall, which is 14 feet thick. The Committee then went down the trench, and minutely inspected the bottom from end to end, in addition to the trial-holes that had been sunk. On the inspection being completed, Mr. Hewson advised the Committee to strengthen their hands by taking the opinion of the most eminent Engineer available as to the propriety or otherwise of now replacing the puddle-wall; and they decided to consult Mr. G. H. Hill, M. Inst. C. E.

Stoppage of Water Supply through the Miners' Strike.—Owing to the withdrawal of all the men employed at the Durham Mines on the 12th inst., the day fixed for the commencement of the "play" time, the pumping-engines were stopped, and those towns which were dependent upon the mine water for domestic or manufacturing purposes were consequently brought within the prospect of a water famine. At Houghton-le-Spring, which is served from a feeder in the Houghton Colliery, and derives about 90,000 gallons of water a day from this source, the inhabitants found themselves suddenly deprived of it, and had to draw upon their reservoirs, the contents of which it was expected would not last beyond Thursday or Friday. Other sources had consequently to be resorted to. At Newbattle, Herrington, and Washington, the inhabitants were similarly inconvenienced. A wish was expressed by the agent of Lord Durham (Mr. Stobart), that the people around the Lambton Collieries should not be without water. An offer was made to the miners that they could, if they pleased, send their own enginemen to keep the water supply going; but it was refused. A similar offer was made at Mr. Stobart's own colliery at Washington, with the same result. The Houghton-le-Spring Urban Sanitary Authority on the first day of the stoppage, to avoid the inconvenience that was likely to arise, wired to the Federation Board at Durham, asking that an engineman and fireman might be supplied to pump the water from the Houghton Colliery; but the reply simply was that it could not be allowed. The policy of withdrawing the enginemen is unaccountable, and altogether unjustifiable, especially in view of the fact that diphtheria was prevalent in one of the places deprived of water.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by correspondents.*]

Regulating the Seal in, and Drawing the Tar from, Hydraulic Mains.

Sir,—In reply to the letter upon the above subject, signed "J. H.," in your issue of the 15th inst., I beg to submit that the illustration of the above, as given in your issue of the 8th inst., and that to which he refers as having appeared in the Journal of Dec. 16, 1879, possess no features of similarity, excepting that in both the connecting-pipe is attached to the bottom of the "main," which is by no means new.

Paisley, March 19, 1892. Geo. R. Hislop.

Sir,—In your issue of the 8th inst. is a description of an invention by Mr. G. R. Hislop, of Paisley, for "regulating the seal in, and drawing off tar and liquor from, hydraulic mains." I now write simply to say we have several regulators exactly similar, even to some small details, now in use at these works, manufactured to my design, and fitted up by Messrs. Dempster some years ago.

Bath, March 19, 1892. C. Stafford Ellery.

The Standard of Light.

Sir,—The ideal standard of light, as a basis of photometric measurement, is one that should not have an uncontrollable variation of character. Consequently, any form of luminous effect, depending for its origin upon such variable agents as are the combustible or oxidizable elements (whether solid, gaseous, or liquid) and an oxidizing element such as air, that changes in volume, in temperature, and chemical constitution every minute, can never be an ideal standard of light.

The only form of luminous energy that can be considered to fulfil the ideal requirements, as a basis of photometric measurement, would be a standard electro-resistance filament *in vacuo*, such a filament to be raised to a condition of highly luminous incandescence by the passage of an electric current of a specific voltage, determined by comparison with the luminous energy of a sperm candle of a known weight, and consumed under as perfect a condition as the imperfect control of the variable elements will permit. A careful observation of the voltmeter during the photometric test would comprise the principal attention required to obtain a perfect standard of light. Where dynamo-electric energy is not available, a set of primary and secondary batteries of regular output may be employed.

Manchester, March 19, 1892. B. H. Thwaite.

The Inclination of Foul Mains.

Sir,—I fail to see any point in the reply of Mr. Armitage to my letter on this subject. In the first place, he is not in a position to refute any argument or statement I may have advanced—not having seen the book mentioned, and having merely "referred" to the paper. Had he taken the trouble to read the latter, he would have found a distinct reference to improved illuminating power, and also a statement to the effect that I did not care to claim any originality. As a matter of fact, the whole thing, including the use of steam, or otherwise, is simply a carrying out of the suggestions published by Bowditch in 1867, which have formed the basis for a large number of hot condensers of various kinds. The fact that Mr. Armitage's arrangement was erected in 1882, has no bearing upon the forestalling of his published description; nor do I find that he has advanced anything in disproof of my remark as to the agreement between my views and his own.

Salisbury, March 17, 1892. N. H. Humphrys.

Coal Gas: Its Manufacture, Distribution, and Consumption.—A Correction.

Sir,—I was very pleased to notice, in your issue of the 8th inst., the commencement of a series of articles on the above subject. Being written specially for the use of gas students, in view of the approaching Examinations in Gas Manufacture, accuracy is the first essential. Therefore the writer will perhaps pardon me for drawing his attention to what will most likely prove to be a printer's error. In his table of the approximate proportions of carbon, &c., in combustible minerals, he gives the percentage composition of lignite as follows: Carbon, 396·01; hydrogen, 15; oxygen, 25·93. Assuming the chemical composition of lignite to be $C_{33}H_{15}O_9$, and taking the atomic weights of carbon, hydrogen, and oxygen to be equal to 12, 1, and 16 respectively, the quantities by weight of each element should be: Carbon, 71·35; hydrogen, 2·70; oxygen, 25·95. This agrees very fairly with the following analysis by Vaux of dry Bovey Tracey lignite: Carbon, 66·314; hydrogen, 5·627; oxygen, 22·861; nitrogen, 0·565; sulphur, 2·364; ash, 2·269. Another authority (whom I regret I cannot verify) gives the composition of lignite as carbon, 65·7; hydrogen, 5·3; oxygen, 29—comparing very favourably with the previous analysis.

March 15, 1892. C. J. M. A.

[As will be seen by the note appended to the second instalment of the article, which appears elsewhere in the Journal to-day, the errors pointed out by our correspondent had already been detected; and they would have been corrected last week had not the continuation of the article been unavoidably held over.—Ed. J. G. L.]

East London Water Company.—At the forthcoming half-yearly general meeting of this Company the Directors will recommend a dividend at the rate of 8 per cent. per annum; leaving a balance of £12,566 to be carried forward.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following progress was made with Bills last week:—

Opposition withdrawn:
Ashton-under-Lyne, Stalybridge, and Dukinfield (District) Water Bill.
Liverpool United Gas Bill.
Southborough Local Board (Gas) Bill.

Bill committed: Llanbradach District and Aber Valley Water Bill.

Bills reported, with amendments: Bristol Gas Bill; Kilmarnock Corporation Water Bill.

Petitions against the Llanbradach District and Aber Valley Water Bill were presented from Promoters of the Rhymney Valley Gas and Water Bill, the Pontypridd Water-Works Company, the Merthyr Tydfil Rural Sanitary Authority, and others.

HOUSE OF COMMONS.

Monday, March 14.

THE METROPOLITAN WATER COMMISSION.

Mr. RITCHIE said that perhaps the House would like to know the names of the Commissioners appointed on the Royal Commission to consider the question of the Metropolitan Water Supply. They were: Lord Balfour of Burleigh (Chairman), Sir George Barclay Bruce, C.E., Professor James Dewar, F.R.S., Sir Archibald Geikie, Mr. George Henry Hill, M. Inst. C. E., Mr. James Mansergh, M. Inst. C. E., and Dr. William Ogle, F.R.C.P. The terms of the reference were as follows: "Whether, taking into consideration the growth of the population of the Metropolis, and the districts within the limits of the Metropolitan Water Companies, and also the needs of the localities not supplied by any Metropolitan Company, but within the watersheds of the Thames and the Lea, the present sources of supply of these Companies are adequate in quantity and quality; and, if inadequate, whether such supply as may be required can be obtained within the watersheds referred to, having due regard to the claims of the districts outside the Metropolis, but within those watersheds, or will have to be obtained outside the watersheds of the Thames and the Lea."

The following progress was made with Bills last week:—

Further Standing Orders complied with: Barry and Cadoxton Gas and Water Bill; Mold Water Bill; Stamford and St. Martin's Stamford Baron Gas Bill.

Bills read a second time and committed: Brynmawr and Abertillery Gas and Water Bill; Southend Gas Bill.

Bills referred to a Select Committee consisting of Mr. Gurdon (Chairman), Mr. F. H. Evans, Mr. J. W. Sidebotham, and Mr. Hingley; to meet on Thursday, March 24: Barry and Cadoxton Gas and Water Bill, Brynmawr and Abertillery Gas and Water Bill, Exmouth and District Water Bill, Mold Water Bill, Pontypool Gas and Water Bill, Rhyl District Water Bill, Rhyl Improvement Commissioners Bill, Stamford and St. Martin's Stamford Baron Gas Bill.

Bills reported: Airdrie and Coatbridge Water Bill; East Grinstead Gas and Water Bill.

Bill withdrawn: Pontypool Gas and Water Bill.

Petitions against the following Bills were withdrawn:—

Airdrie and Coatbridge Water Bill, from the Upper Ward District Committee of the County Council of Lanarkshire, and from Owners of lands and mills on Hilly Gill Burn and Culter Water.

Blackburn Corporation Bill, from the Lancashire County Council.

Stamford and St. Martin's Stamford Baron Gas Bill, from the Guardians of the Stamford Union.

LEGAL INTELLIGENCE.

COUNTY OF LONDON ASSESSMENT SESSIONS.

Sessions House, Clerkenwell, E.C.—Saturday, March 12.

(*Before Sir* P. H. EDLIN, Q.C., *Chairman, and a Bench of Magistrates.*)

The Gaslight and Coke Company's Assessment Appeals.

To-day the parties interested in the above appeals were again in attendance at the Court, with the object of submitting the allocations of the respective rateable values among the various parishes, as arranged on the previous occasion (see *ante*, p. 398), and considering the question of costs.

The CHAIRMAN having inquired if any agreement had been come to,

The SOLICITOR-GENERAL said that the representatives of the appellants had supplied the respondents with a tabular statement [see next page] which showed the result of the judgment; and though there were some small differences between them as regarded the figures worked out, they were so small that he was prepared to accept the valuations as made by the advisers of the Company.

Mr. LITTLER said that the Company had prepared a supplementary statement, showing each parish in the City of London Union; and he asked his Lordship to correct each parish *seriatim*.

The SOLICITOR-GENERAL said he had appeared throughout the proceedings as Counsel for the City of London Union; and the case all through had been treated as one.

The CHAIRMAN asked if a subdivision of the amount allocated to the City of London Union generally was necessary for the purpose of the present question, having regard to the fact that one rate of 4s. 11d. in the pound had been agreed upon throughout the Union.

The SOLICITOR-GENERAL replied that, in his opinion, it was not at all necessary.

Mr. LITTLER contended that the parishes should be separated. Supposing, he said, there were parishes which were 100 per cent. too high, in those instances it would have been absolutely necessary for the Company to appeal, and to have incurred the costs of coming before the Court.

The CHAIRMAN said he had worked out the figures, and found that the Assessment Committee of the Union had assessed the Company at £4879 less than the judgment of the Court had awarded. The appellants admitted this; but they said that, when it came to be subdivided, it would be found that some parishes had put them up too much. He thought it must be taken on the balance.

Mr. LITTLER pointed out that in the City of London Union a reference to the notices of appeal would show that they had succeeded in 53, and had lost in 51 cases. It would have been absolutely impossible to have tried all of them one by one; and the next quinquennial period would have arrived before the whole of them could have been considered. It was to save all the expense they could and to expedite the appeals, that they were willing that all the matters should be heard practically together.

The CHAIRMAN said the Company had succeeded in reducing the assessments in 15 out of 23 parishes or unions to the amount of £47,909; but they had failed in respect of certain parishes, in which it was shown that the Assessment Commissioners had under-assessed them to the amount of £7539. If they deducted the £7539 from the £47,909, they might say the Company were still £40,370 to the good. If the rates were taken at an average of 5s. in the pound, the result would be that the Company would have gained £10,000 a year during the quinquennial period. On the other side, the Company had failed, as regards the figures given in their cases, to the extent of £209,862.

Mr. LITTLER said that, if there was to be a comparison, it should be made by means of Court figures against Court figures, or paper figures against paper figures. If the Company's appeal cases had set the figures too low, he suspected the difference on the other side would be almost as startling as his Lordship's figures; because they had put their figures in almost every instance higher than they had proved in Court.

In the course of further discussion,

The CHAIRMAN asked whether it was the intention of the Company to abide loyally by the decision of the Court after the long time that it had engaged their attention. He could not but think that the Company had been most considerately dealt with.

Mr. LITTLER said that at the present moment they had not arrived at that degree of gratification. It was a matter of such large amount and such grave importance, that he hesitated, without further reflection, in advising his clients on the matter, unless he could assure them that he was absolutely clear, in point of law, that it was not liable to be upset. There were other parishes outside—of some importance—which had not appealed, which were in a difficulty in dealing with that matter. The question was, would they be put up or down; and would they also have to deal with them by their coming with a supplemental list?

A discussion arose as to whether it might not be possible, by consent, to raise the figures in the parishes where it was shown that the Assessment Committee had under-estimated the value of the property; but it was felt that it would involve difficulties which it was not desirable to encounter.

Mr. LITTLER then addressed himself to the general question of costs. He suggested that the course for the Court to adopt was to say the appellants had substantially succeeded; that they would not have achieved that success had they not come to the Court; and that therefore it was only reasonable that they should have their costs. They had sought relief where, in order to get it, they had incurred costs which the Legislature said they were entitled to have. They went to the Assessment Committee, and obtained no relief; but they came to the Court to succeed, as his Lordship had said, to the extent of something like £10,000 a year.

The CHAIRMAN: But then we cannot overlook this, that when you went before the Assessment Committee you went with figures which were not accepted; and supposing we could find they were absolutely unacceptable—that they opened no door to consideration or negotiation, and afforded no hope of an ultimate amicable settlement—why then your figures would not be adopted. With regard to Mr. Field's figures, I abstain from expressing my opinion about them. Possibly before the end of this case, I may be asked to do it; and I really think it may be my duty to do so if I am asked.

Mr. LITTLER reminded his Lordship that it had been laid down in the High Court that appellants were not bound to show a figure to the Assessment Committee, but that they had done their duty if they simply told them the figures were too high. However exaggerated their figures might be, or however minimized, the matter for the Assessment Committee was the figures they had to determine. Counsel then pointed out the cases in which the Assessment Committee had increased the Overseers' figures, whereas the Court had held that they should be reduced. He submitted that, having regard to the whole matter, the course to be adopted should be that the Company should be entitled, in all cases where they had succeeded, to receive their costs—paying where they had not obtained relief; or, taking a broad view of the thing, that his Lordship should say that, this being an important matter, it was one which both sides were justified in bringing before the Court, and there should be no costs on either side. There had been relief on both sides, and there had been mistakes made on both sides; and, under the circumstances, it would be reasonable to make a fair field between the parties. Otherwise he should press upon his Lordship the hardship of compelling the Company to pay costs, or even not to receive costs where they had obtained substantial relief.

The SOLICITOR-GENERAL said he would endeavour, on the question of costs, to assist the Court with suggestions which appeared to him to be sound and reasonable, looking at the whole course of the litigation. He appeared in eight different cases; and the observations that he might make would not, of course, equally suit each of his clients, having regard to the different results that had been obtained. The suggestion of Mr. Littler that there should be a sort of general set-off, and that no costs should be given to either side, he submitted was the only course that would work absolute injustice to everybody. If,

Apportionment of the Rateable Value among the various Parishes where the Assessment has been appealed against (all the Figures given being net).

Parish.	Judgment.				Assessment Committee.			Gas Company.		
	Direct Mains.	Indirect Mains.	Works.	Total according to Judgment.	Mains.	Works.	Total from Valuation Lists.	Mains.	Works.	Total from Company's Cases.
City of London Union	£55,858	£838	..	£56,696	£51,817	..	£51,817	£17,566	..	£17,566
Bethnal Green*	6,686	287	£5,500	12,473	6,600	£6,400	13,000	2,405	£7,001	9,406
Bloomsbury	8,516	258	..	8,774	8,498	..	8,498	2,958	..	2,958
Chelsea†	8,819	366	..	9,185	9,154	..	9,154	3,996	..	3,996
St. Clement's Danes	3,602	57	..	3,659	4,065	..	4,065	1,333	..	1,333
St. George, Hanover Square	22,233	276	5,014	27,523	29,750		29,750	7,338	6,527	13,865
St. John, Hackney	17,152	1,512	..	18,664	22,000	..	22,000	6,676	..	6,676
Hampstead	11,121	..	..	11,121	10,655	..	10,655	3,409	..	3,409
Islington	28,148	725	..	28,873	54,490	..	54,490	9,106	..	9,106
Kensington	27,242	59	10,000	37,301	28,350	10,000	38,350	8,995	10,000	18,995
St. Martin-in-the-Fields	9,828	472	..	10,300	11,525	..	11,525	3,462	..	3,462
St. Marylebone	24,383	..	..	24,383	29,000	..	29,000	7,623	..	7,623
St. Mary-le-Strand	1,222	33	..	1,255	1,553	..	1,553	444	..	444
Paddington	16,932	..	..	16,932	17,284	..	17,284	5,138	..	5,138
St. Pancras	24,395	101	16,000	40,496	45,332		45,332	7,878	15,212	23,090
St. Paul, Covent Garden	2,188	..	..	2,188	2,353	..	2,353	669	..	669
Liberty of the Rolls	422	..	..	422	440	..	440	129	..	129
Precincts of the Savoy	453	21	..	453	320	..	320	137	..	137
Shoreditch	12,298	220	14,724	27,242	15,541	14,724	30,265	4,107	14,724	18,831
St. George, Southwark	1,222	..	..	1,222	897	..	897	391	..	391
Stoke Newington	3,283	..	..	3,283	3,700	..	3,700	1,005	..	1,005
St. James, Westminster	13,994	..	..	13,994	13,335	..	13,335	4,139	..	4,139
St. Margaret, Westminster	11,670	748	9,240	21,658	20,909		20,909	5,431	10,457	15,888
Totals	..	..	..	£378,097	..		£418,692	..	..	£168,256

* The Works in the Parish are agreed at £6400—the figure £7001 for Works which appears in the Company's Supplemental Case for Bethnal Green having been inserted in error.

† The portion of the Dock in Chelsea agreed at £195 must be allowed in addition. It is included in Mr. Ryde's figure of £5998.

having regard to the circumstances of the case, the Company could be held to have properly initiated that expensive litigation, and to have fairly carried it through and succeeded, then Mr. Littler had a strong case for applying for costs. It might be that, although he was entitled to ask for them in that way, taking it as a whole, the Court would say he was not to have his costs, because of certain matters connected with the getting up of his case or the presentation of it to the Court. Still, although refusing to allow him costs on this ground, which might be a reasonable course, it would be most unreasonable to follow this up by saying that, where it had been absolutely and completely defeated by the parish or the union which had been at the cost of maintaining, and had successfully maintained, its own valuation, the ratepayers should be burdened with the expense. Dealing with the cases *seriatim*, he pointed out that in the City of London Union, treating it as one case, the rateable value was double what it was in any other of the litigating parishes, with the exception of St. Pancras; and it was £16,000 more than it was in St. Pancras. That property was assessed at £51,817, which sum the appellants contended should be reduced to £17,566. The result of his Lordship's judgment showed that the Assessment Committee had put it at £5000 too little; and therefore it was clear the respondents ought to have their costs. The public authority, and the Assessment Committee who represented them, had done nothing wrong, except so far as they had been too lenient to the Company.

The Chairman pointed out that in their valuation the Company were too low by £39,130.

The Solicitor-General said the effect of putting so small a figure was to make it impossible for the parties to negotiate upon any basis of settlement. His Lordship knew how very reluctant parochial authorities and assessment committees were to enter upon a litigation such as that in which they had been engaged; and undoubtedly if there had been any proffer of figures so near their own as these, it might be quite reasonable that the respondents should enter into negotiations; and that, not having done so, the question of costs should be dealt with as if both parties were in some respects to blame. But the putting forward of what, in the face of the decision of the Court, he might now call ridiculously inadequate figures, was at once a bar to any possibility of discussing or arranging the matter. He submitted that the City of London Union ought to have the whole of their general costs; but in the cases of those parishes where the Company had succeeded, there should be a disallowance of the costs in respect to the special expenses which related to the different parishes. Passing to the case of Bethnal Green, where the reduction had been £527—from £13,000 to £12,473—it was agreed that the assessment should stand at £13,000. In that case the appellants had wholly failed; and the respondents were therefore entitled to costs.

The Chairman: There is a point arising there which is deserving of attention, and which has been a source of embarrassment on more than one occasion in considering this case. That is that, although their valuation of the mains and pipes (I speak of the direct mains) was very much less than that which has been presented on behalf of the Assessment Committee, yet, strange to say, the Company, for some reason or other, put a far larger value upon their works than that. It might be apparent what their object was with regard to this; but you observe that, in respect to this parish, it is very remarkable, because they valued the mains at £2405 only, and, according to the judgment of the Court, they are of the value of £6686. Do you see that?

The Solicitor-General: Yes, my Lord, I do.

The Chairman: I can surmise—I can conjecture what their motive was, and what their reason was, for putting so much higher value upon their stations, and upon the indirect mains in some instances, than the parishes themselves, while they were attributing so much less value to the direct portions of the works; and I wish Mr. Littler to understand that I cannot help thinking that this has very much increased the labour and cost of this matter, for which we have to thank the appellants. It was most embarrassing, and very difficult to fathom and correct.

Mr. Littler: It simply arose from the difference of principle, my Lord—of the size, that is all.

The Solicitor-General said he would pass away from the case of Bethnal Green, with the remark that it was one in which the appellants had absolutely failed. He then proceeded to refer to the case of Islington, which, he said, stood apart from the others in the magnitude of the reduction that had been made—from £54,490 to £28,873.

The Chairman said he could not understand how that parish went so far astray.

The Solicitor-General said that some excuse might be found in this: The assessment had previously been agreed at £45,000, and had not been challenged; but undoubtedly the Assessment Committee did think it right to substantially raise it. He asked the Court to look at the figure which the Company put forward—viz., £9106—which was entirely unreasonable; and the Assessment Committee surely could not be blamed if, in the absence of any definite and trustworthy information, they considered there was an accretion of value in the quinquennial period. In the case of St. John's, Hackney, the Assessment Committee reduced the Overseers' figures of £29,167 to £22,000; and these had now been brought down to £18,664. But the figure the Company desired was £6676, or one-third of what the Court had decided to be proper. As between, on the one side, an appellant who had every means of knowledge, and, on the other, gentlemen constituting the Assessment Committee, who could not possibly employ expensive agencies and give much time to the consideration of these cases, he asked the Court to say that this was a success for the Assessment Committee, and that they ought to have the general costs of the litigation. The same observation applied to Stoke Newington, where the Court had reduced the assessment by £417—a sum which was £2278 more than the figure at which the Company put it. He submitted that where the Assessment Committee were in error to the extent of one-eighth, and the Company to the extent of seven-eighths, the respondents ought to have the sixth-eighths, or three-fourths of their costs. This was supposing they were on an equal footing; but what he asked the Court to remember was that the greatest error was on the side of the litigant who had the least excuse for being in error at all.

The Chairman: There is another point which strikes me, and which you would wish, perhaps, not to overlook, Mr. Solicitor. It is this—that when we look at the differences between the values as presented by the Assessment Committee, compared with the judgment of the Court in respect of these several unions and parishes, we cannot relegate them to any general principle that appears to have actuated the Company with regard to all of them; the differences are so widely disproportionate. If, with the information in their power, we found that the differences were pretty well the same in proportion to the amount actually awarded in each of the parishes, we might come to the conclusion that, rightly or wrongly, they sent in their estimates and founded their appeals upon certain principles; but the differences are so disproportionate, that one is forced to the conclusion that they were really guided by no principle at all. I do not know whether I make myself intelligible.

The Solicitor-General said he did, perfectly; and it was curious that the next parish he (the learned Counsel) was going to mention was one which exactly indicated the point his Lordship had mentioned. In Shoreditch, the assessment was £30,265; the judgment of the Court fixed it at £27,242; and the amount put forward by the Company was £18,831. In that case, again, the divergence of the figures was too great to allow of a compromise. In Kensington, too, there had been an infinitesimal reduction—being £1000 off £38,000; but the figures put forward by the Company were £18,995.

The Chairman: Including the works and the indirect mains, as to which there was little, if any, difference.

The Solicitor-General said therefore the comparison was between £27,000, excluding the works, and £8995, which was again an irreconcileable and undiscussable figure. In Shoreditch, excluding the works, the Company's figure was £4107 against £12,290, or about one-third. The learned Counsel then proceeded to refer to the question of costs as applicable to the proceedings being adjourned till the figures relating to the year 1890 could be prepared to be taken into consideration—contending that these costs should be visited upon the Company; and also to the arrangements as to the cost of the shorthand

notes which had been printed for the use of the Court and the several parties.

Mr. POLAND also addressed the Court with reference to the cases in which he was concerned apart from the Solicitor-General—viz., Bloomsbury; St. Clement's Danes; St. George's, Hanover Square; St. Margaret's, Westminster; Hampstead, St. Marylebone, Paddington, and St. Pancras—claiming that, on the results of the figures, the respondents ought to be allowed their costs. With regard to St. Pancras, however, he considered this was a case in which the Assessment Committee and the Company were both wrong; but he thought the appellants should not have their costs.

Mr. ROBINS, for Paddington, also contended that they ought to have costs in that case, on the ground that the Company had only succeeded in striking off 1-48 th of the whole assessment.

The Court then adjourned till the following Monday.

Monday, March 14.

Mr. POLAND to-day resumed his address on the question of costs; dealing with six parishes in the Strand Union—viz., St. Martin's-in-the-Fields, St. Clement's Danes, St. Mary-le-Strand; St. Paul's, Covent Garden, the Liberty of the Rolls, and the Precincts of the Savoy.

Mr. FULLARTON, on behalf of St. Saviour's Union, Southwark, also applied for costs; and Mr. W. RYDE followed, for St. Luke's, Chelsea—the assessment having, in both these cases, been below the amounts awarded by the Court.

A discussion then arose as to the treatment of the City of London Union as a whole or in separate parishes.

Mr. LITTLER said it was an inevitable result that in each of those cases there must be a judgment; and there must be 68 judgments that the Company had been right, and 41 that they had been wrong. In the 41 cases in which they were wrong, he, of course, did not contend that they ought not to have to bear the expense; but in those in which they had been right, it was clear that the Company ought not to pay the costs. It was true the Company had been exceedingly wrong where they were wrong; but this was so with the parishes also.

The CHAIRMAN: You ask us, then, to consider these parishes as if they were separate individuals. That is all very well. But how can we overlook the fact that the appellants are the same persons in all? and why should we overlook the fact that there is a Union whose Solicitor and Counsel are instructed on the part of every parish included therein, and that you have acquiesced in our putting a value on the whole property in that Union, and have presented this value to us in your own tabular statement?

Mr. LITTLER said the respondents were the Assessment Committee, but that Committee had presented two sets of cases, in 68 of which they were totally wrong, and in 41 of which they were absolutely right. Under these circumstances, he asked how the Assessment Committee could have any costs at all.

The CHAIRMAN said it was in his mind that they ought not to allow, as to the parishes which had made an over-assessment, any of the costs of their case—that was of stating their case. But he could not help looking at the enormous differences between the sum awarded and that for which the Company stood out. They were fighting for impossible amounts. He did not say that they did not do so in good faith. But their demands were excessive in every one of those matters; and he could not but think that it shut the door to negotiations which might otherwise have been possible.

Mr. LITTLER said that, so far from shutting the door, the figures that were before the Assessment Committee in every case were proposals amounting to from 10 to 10½ per cent., which was the identical figure at which the South Metropolitan Gas Company's case had been settled.

The CHAIRMAN: Was the South Metropolitan Company's case tried before us, or did they come to terms?

Mr. LITTLER: When they came here, they came to an understanding on these very terms—from 10 to 10½ per cent.

Mr. POLAND: I was against the Solicitor-General in that case. We were both so reasonable that we came to terms.

The CHAIRMAN said he could not think that the respondents would have found Mr. Littler unreasonable. He wished the Company had taken such advice from Counsel as Mr. Littler's would be, especially when they found they were obliged to dispense with the evidence of their own experienced valuers.

Mr. LITTLER said the proposals that were made to the parishes were infinitely higher than the figures in the cases, and were made with the view to enable the Assessment Committee to arrive at something reasonable. They were figures much larger than those that the Company were advised to fight upon; and in no instance were they presented to the Court as being the right ones, but those which were submitted to the Assessment Committee. The City of London Union absolutely declined to hear them. He inquired if it was to be laid down—if so, it would be for the first time—that, if they asked for more than they obtained, and then succeeded in getting a substantial reduction, thereupon they were to be punished.

The CHAIRMAN said the Court would be very careful not to express such an opinion. As to making a rule of that kind, it was out of the question. They had again and again proceeded on the right an appellant had to receive his costs, although the demand of the reduction exceeded the actual allowance made by the Court. But this was not an ordinary case. This was a case which had to be judged, to a great extent, by its general results, and with a due regard to the magnitude of it, and to the complexity of the calculation.

Mr. LITTLER pointed out one consideration which seemed to destroy absolutely the force of the smallness of the figures in the Company's cases. A single addition of 2d. per 1000 cubic feet in the price of gas would have brought them within £4000 of the figures fixed by the Court. Every one of the valuers on the other side argued on the advanced price; and one of them got up as far as £187,000 by reason of that increase. The learned Counsel proceeded to quote from the figures given by the valuers on the other side; urging that the Court had received but little assistance from them, and that, as they had put outrageous figures before the Court, the appellants ought not to pay the costs of those witnesses. There was nothing extraordinary in an appellant putting his case too low; and in any ordinary case, the moment the respondents failed to establish their figures, they failed to get their costs. Under no circumstances, he submitted, in the 14 or 15 parishes in which they had succeeded, according to ordinary principles, could the Company be called upon to pay any of the costs. The discretion under the Metropolitan Act was a judicial one, and must be guided by judicial practice and knowledge; and the judicial common knowledge was that a person who had failed could not get his costs. Under the Judicature Acts, the Court had not only deprived persons of costs, but had ordered them to pay their opponents' costs, although they had won. But this was done only on the ground of attempted fraud, and an endeavour to deceive the Court. He would be insulting the intelligence of the Court, and insulting himself, if he assumed that those whom he represented had attempted to deceive or to cheat the Court. They had been conducting a *bonâ fide* case; but the Court had held that they were wrong in principle. Therefore the whole current of judicial decision and judicial discretion, and his Lordship's judicial discretion, must be limited within judicial lines; and those judicial lines were that under no circumstances, short of absolutely discreditable behaviour, could a person who had succeeded to ever so slight an extent be subjected to costs. He had already pointed out that, had they made a correction of 2d. per 1000 cubic feet for the increased price of gas, it would have come to a little more than the Court had awarded. Of course, he could not tell what might have been the moving influences in the minds of the Court; but he assumed that they had properly thought fit to look a little forward, and that all sorts of things had been taken into consideration; indeed, it was stated in the judgment that the Court did think fit to take into consideration the power to increase the price.

The CHAIRMAN said this was so. He thought it right to state in the judgment certain reasons which actuated them, and to draw attention to certain powers which the Company possessed, and which they had not overlooked. At the same time, they drew attention to the difficulties which at certain crises the Company would have in carrying on their undertaking. He trusted that nothing had escaped them.

Mr. LITTLER went on to say that, if they had corrected their calculation to the extent of that 2d., the Company's figures would have been a little above those fixed by the Court. Not having, on principle, taken this into account, how could it be argued against the Company that they had been ridiculously wrong in the figures presented to the Court, when they told the Court that it should have been taken into account? They were wrong to a large amount because the amount involved was large, that was all. Their failures were worth comparing with what they had won, in which cases he ventured to say they ought to have their costs. In Bloomsbury, there had been a gain of £276; in Chelsea, £31; in Hampstead, £466; in the Savoy, £133. There were several such cases; but there was not one that was more than £750. On the other hand, in St. Clement's Danes, they had gained £406 on £4065, or exactly 10 per cent. Surely this was a case for costs. In St. George's, Hanover Square, they gained £2227 on £29,750, or 8 per cent.; in St. John's, Hackney, they gained £3336 on £22,000, or close upon 15 per cent.; and in Islington, nearly 50 per cent. The Solicitor-General said triumphantly, regarding Islington, "Oh, but you assented to £45,000." Then, of all people, Islington ought to pay the Company's costs, because they had been getting too much out of the Company for the last five years. There never could be a stronger case for costs than that of Islington.

The CHAIRMAN said the reply to the Solicitor-General was obvious. He could not help smiling when he heard the argument that they should be excused from paying costs on the present occasion because they had been for the last five years receiving a higher amount than that to which they were entitled. They were far more wrong than the Company were. The Court could not overlook this fact.

Mr. LITTLER said that throughout the Company were wrong on one ground only. If they had tied themselves to 1889, as possibly, in strict law, they might have done, not a word would have been said about the increased price. This arose from the laudable desire on the part of the Company that, in the next quinquennial period, there should not be further litigation between the parties. If his Lordship had tied himself to 1889, he could not have informed himself, as he had since, that there was a possibility of a rise in price. Every gas company had the power to raise their price. But this was proved by an event which took place in 1890; and if it had not been put before the Court then, on the 1889 figures, his Lordship could not have taken into consideration the possibility of a rise in 1890, and then the Company would have been absolutely right in their valuation.

The CHAIRMAN said he thought the Court would have taken into consideration the existence of that power. He ventured to say more than once that, if they had to consider what a tenant would give for the works, and what they would let for, surely a tenant, looking at the Act of Parliament, and observing therefrom that he would have a power of raising the price of gas, would let this be an element in determining the price he would give.

Mr. LITTLER, proceeding with his comparison, remarked that in Kensington and Paddington the gain to the Company was between 2 and 2½ per cent.; in Marylebone, upwards of 15 per cent.; in St. Mary-le-Strand, over 18 per cent.; in St. Pancras more than 10 per cent.; in St. Paul's, Covent Garden, over 6 per cent.; in the Liberty of the Rolls, nearly 4 per cent.; in Shoreditch, 10 per cent.; and in Stoke Newington, upwards of 11 per cent. These were substantial wins; and even in the lowest cases of Paddington and Kensington, the 2 per cent., multiplied by the five years of the quinquennial period, represented 10 per cent. or more. Wherever they had won £1000, it must be remembered that, taking it over the five years, it came to £5000; and a rate of 5s. in the pound on this was a considerable sum. In all those cases, he submitted the appellants should be allowed their costs. The learned Counsel then went on to discuss the manner in which the costs of the preliminary proceedings, prior to the figures of 1890 being taken into account, should be dealt with, and said that those costs should not be visited upon the Company, as what was done was for the purpose of assisting the Court, and avoiding further litigation. With regard to the costs of the short-hand notes, he suggested that the arrangements by which the parties had been supplied with copies by the Company should be adhered to. In dealing with the costs, the other side were trying to get the very last sixpence in the shape of "skinning the hare"—the hare which was

paying one-sixtieth of the whole rates of the Metropolis, after having a hard fight; and they were calculating it on the contention that the Company were losing from their reserve funds, though they were compelled to charge a higher price for gas, and were paying more for labour, which did not seem to have weighed with the Court.

The CHAIRMAN said Mr. Littler was not justified in saying this. The points were fairly submitted to the Court; and Counsel must presume that the Court fairly considered them, and gave due weight to them.

Mr. LITTLER said it was a very different "weight" from that for which the appellants contended; and he could not but think that some of them had had very little weight, when weighed with an impartial mind. The Company, who were paying one-sixtieth of the rates of the Metropolis, were dealt with as if they were in a County Court.

The CHAIRMAN: There is not a parish in the Metropolis in which you have not valuable property, leaving out those parishes which are under the South Metropolitan Gas Company.

Mr. LITTLER: Under proper conditions, instead of paying a sixtieth of the rates we should not perhaps pay a six-hundredth.

The Court then retired to consider their judgment. On returning,

The CHAIRMAN expressed his regret that the Court found it impossible to give judgment that day. Their hesitation arose principally in regard to the valuations in the City of London Union, and to what had been presented to them in respect of the relative proportions of increase or decrease in the present 112 valuation lists. They found, upon further investigation of the tabular statement, that the effect might be very different, when the results come to be made, from what had been contemplated on either side. It would obviously not amount to giving the appellants the advantage of the difference between the highest assessment in the Union, regarding the parishes constituting the Union as a whole, and the total assessments appearing at present in the valuation lists. It might be that, instead of the appellants profiting to the extent of (say) £5000 during the quinquennial period, when the alterations came to be made the result might possibly be still more to their benefit. The Court would take time to consider the questions arising out of the 112 assessments, although they had not overlooked the force of the argument in support of the appellants' contention, that, in respect of such of them as were shown to have been too highly assessed, they should be entitled to costs.

Mr. DANCKWERTS, in reply to a question by the Chairman as to how the general result would affect the total liability for rates in the Union, said that the assessments would be reduced by something more than £10,000.

The CHAIRMAN said, if Mr. Danckwerts's figure was correct, then the Company would gain some £6000 more than the difference between the assessments as found by the Court and the total of the assessments in the Union. That was not a subject for congratulation, except for those who rejoiced that justice could not be done in these cases because the Court had not the power of increasing the assessments where their judgment showed they ought to be increased. Therefore the appellants would be undeservedly the gainers; and this appeared to him to be a matter well worth notice in regard to the argument of Mr. Littler that, in each of the 68 cases in which they had won, the appellants should have their costs.

Mr. LITTLER said that he hoped his Lordship would not entertain any such question as that. The issue was what had happened in the individual cases, not what had happened to someone else. There was no power to raise the assessment; and that it was not raised in certain cases was the fault of the Assessment Committee, not that of the Company. The Committee thought fit to raise some things by 100 per cent., and to leave others alone. Surely the Company should not be punished for that.

The CHAIRMAN said the Company had the full advantage of those under-assessments; and the Court could not deprive them of it. But they had yet to consider whether they would be wrong in taking those under-assessments into consideration when the appellants asked to be awarded costs against the Union in respect of certain other cases.

Mr. LITTLER protested against this view of the matter being taken.

The Court then adjourned; no date being fixed for judgment on the questions raised.

Ottoman Gas Company, Limited.—The accounts of this Company for the half year ending Dec. 31 last show that the gas-rental amounted to £8574, and the net profit to £3463. The sum standing to the credit of the profit and loss account is £4000, which the Directors recommend should be dealt with as follows: To be carried to the reserve fund £1000; and to the payment of a dividend at the rate of 7 per cent. per annum on both classes of shares. The dividend will absorb £2625; and leave a balance to go forward of £375.

An Extraordinary Artesian Spring.—A boring for water at Sleaford, in Lincolnshire, for the supply of some large new maltings for Messrs. Bass and Co., of Burton-on-Trent, is being attended with remarkable results. At a depth of 156 feet in the limestone beds of the lower oolite formation, Messrs. Le Grand and Sutcliff, of London, have just struck a very powerful artesian spring, which rises to 12 ft. 6 in. above the ground, and rushes out of the bore-pipe 3 feet above the surface at the rate of upwards of 12,000 gallons per hour, or nearly a ton of water per minute. The spring increases in strength daily as the boring goes deeper.

The Improvements at the Heywood Corporation Gas-Works.—The minutes of the Gas Committee submitted at the last meeting of the Heywood Town Council, recommended that tenders be obtained for a Livesey washer and tar extractor, for a set of four purifiers, and for Ruscoe's patent stoking machinery; and that Messrs. Jonas Drake and Sons' tender for the erection of generator furnaces be accepted. Mr. Lawton, in moving the adoption of the minutes, referred to a recent visit of the members of the Council to see the new plant already completed at the gas-works, and to the general expressions of satisfaction at what the Committee had accomplished. He felt sure, if they had not commenced the additions at the time they did, they would have been in a dilemma before now. He also called attention to the recommendation that further improvements should be carried out, and said that the whole of the alterations would cost from £4000 to £5000. The report was adopted.

MISCELLANEOUS NEWS.

SHEFFIELD UNITED GASLIGHT COMPANY.

The Half-Yearly General Meeting of this Company was held on Monday last week—Sir F. T. MAPPIN, Bart., in the chair.

The GENERAL MANAGER (Mr. Hanbury Thomas) having read the notice convening the meeting, the report of the Directors, with the accounts for the half year ending Dec. 31 last, the principal features of which were dealt with in the JOURNAL for the 1st inst., were presented.

The CHAIRMAN said he assumed the proprietors would, as usual, take the report as read. It showed that the expenditure on capital account had been very limited—amounting to only £5752. But, as most of them were no doubt aware, the Company were just establishing new works at Grimesthorpe; and this would cause the expenditure to be considerable for a few years to come. That day the Directors had made contracts amounting to £32,000 in connection with these works. The total expenditure of the Company on capital account had been £666,051. At the end of the past year, they had power to call up £92,510; but it had not yet been exercised. The loan capital, which amounted to a sum of £76,073, had not been made use of. The revenue account had not realized such a profit as would enable the Directors to pay the usual 10 per cent. dividend without falling back on the balance brought forward from previous half years; and from this they had taken £5546 3s. 11d. After paying the dividend, there would remain a sum of £1209 12s. 4d. in hand. When the proprietors considered the increase in wages, the shorter hours of work, and the higher prices the Company paid for coals, he thought it would be admitted that the Directors had acted wisely in using some of their surplus funds. The reserve fund, as they knew, was at its maximum—£78,618 17s. Repairs of the works had been continued on the same extensive scale as had been done for some years past. They found the necessity and advantage of this. The purifiers at Neepsend had been renewed to the extent of £5322 during the past half year, and at Effingham Street to the amount of £1533; and they had spent £2753 in replacing boilers and in altering the boiler-house. The shareholders would see by this that the Board had not stinted the expenditure out of revenue to keep the works in first-rate condition. Repairs and renewals of mains and services had cost £1609 more than in the corresponding half of 1890. The income from coke had been £2616 less; and they had realized £694 less for sulphate of ammonia. They had, however, received an additional £1385 for gas. This was not so large an increase as they had been in the habit of having; but the proprietors must bear in mind that this came upon a very large augmentation at the same period last year. The quality of the gas had been fully maintained, and was highly satisfactory. In his opinion, it was better than they had ever supplied during any of the years in which he had been associated with the Company. There were 939 tests made last half year; and the average was 16·06 candles, or equal to 17·56 candles by the London standard burner. Taking the entire year 1891, they made 1815 tests; and the average by that burner was 17·52 candles. Therefore, he thought they were justified in saying that they had supplied the quality, and more than maintained the standard, set up by the Act of Parliament. Upon the leakage, or the loss of gas, he had nothing to remark; this item being satisfactory. Their stoking machinery had been in operation about six months; and although no doubt some little difficulty had been occasioned at times by the newness of the system, they were thoroughly well satisfied with the results they had obtained, both in profits, and also in the facilities with which they could increase the make of gas by using the machinery. The last two years, as the proprietors had been told before, had been against gas companies in regard to expenditure upon coals and labour. As a rule, gas companies all over the country had been compelled to put up their prices—in most cases something like 3d. per 1000 cubic feet. At Liverpool they had advanced the price 4d.; at Leeds, 4d. at Bristol, 5d.; and The Gaslight and Coke Company had raised theirs 7d. The Sheffield Company had maintained their old prices of 1s. 10d., 2s., and 2s. 2d.; and he trusted they would be able to keep to these figures. At all events, the Directors had so far not found it necessary to consider the subject. No doubt the proprietors had realized the fact that the value of their property had been reduced in the last six months by something like £10 for every £100 stock. Why this was so, he could not understand, as there had been no change in the management. He thought the Company had been as successful as in the past. The Directors had been obliged to enlarge the works to meet the ever-increasing consumption. He thought they might all ask themselves why the decline in the value of their stock had taken place. But they must bear in mind that the largest Gas Company in the world had found their stock decline during the last twelve months from 251 to 221 per cent. The Sheffield Gas Company must not, therefore, expect to maintain for their stock exactly the price at which it had hitherto stood. There were timid people who were influenced by changes in the value of their stocks. But those who understood the matter must feel satisfied with companies who could maintain their dividends. To act in the way some shareholders had done showed, in his opinion, some want of judgment. Twelve months ago he attended for the first time a meeting of The Gaslight and Coke Company, and criticized the policy of the management. On receiving the report and accounts from that Company for the six months ending Dec. 31 last, he felt it to be necessary that someone who knew something about gas companies and how they were managed should go to the meeting, and express his opinion upon a subject that was of much importance to a very large body of shareholders. He therefore attended, and pointed out that, whereas in the year 1888 the Company had a reserve fund and balance amounting to £807,000, they had, after paying their last dividend, only £115,000 left. In three years the £807,000 had been reduced to £115,000. He also told them that they were only earning 7¼ per cent. on their stock, although they were paying 12 per cent. dividend. In the observations he made, he ventured to ask the question if it was true, as it was rumoured, "that the Chartered Company's make of sulphate was sold through one broker, who also bought on his own account." Colonel Makins, the Chairman, in his reply, stated

"that the Company did not sell sulphate of ammonia through any broker, but only through the agent of the Company, who never bought an ounce or a ton for himself." That was a very distinct and a very positive reply to his inquiry; and he did not feel himself able to do more than accept it. But Colonel Makins went further; and, in reply to his (Sir F. Mappin's) inquiry, thought fit to attack the Sheffield Gas Company by stating that the results of "the Chartered Company's practice in this respect"—referring to the sulphate of ammonia—"would compare favourably with those of any other gas company, and most favourably with those of the Sheffield Company." He was not prepared at the time to deal with that assertion. But he had since looked at the published accounts of the two Companies; and he found that the statement of Colonel Makins was not quite up to the mark. If The Gaslight and Coke Company had obtained for their sulphate of ammonia the same price that had been paid to the Sheffield Gas Company for theirs, they would have received in 1884 £18,433 more than they did; in 1885, £10,520 more; in 1886, £19,500 more; in 1887, £2456 more; in 1888, £4517 more; in 1889, £4610 less; and in 1890, £23,941 more. The total they should have received more was £79,367; but deducting from this the £4610, there was left £74,757, which the London Company should have received had they obtained the same prices as the Sheffield Company. These figures would show, he thought, that Colonel Makins's statement was not quite satisfactory. The JOURNAL OF GAS LIGHTING had asked him to reply to the statement of Colonel Makins, as, after it had appeared in the papers, there was much comment upon it. There was a trial in the Queen's Bench Division in April, 1890, of a case in which the plaintiff was manager in London for a merchant in tar and other products, and who sued his employer for commission due and damages for wrongful dismissal. The circumstances of that case were as follows: In the month of November, 1888, the defendant was buying pitch, through his manager (the plaintiff); and on the 5th of that month, the plaintiff bought for himself, in a rising market, 1000 tons from Mr. W. G. Blagden, the agent for The Gaslight and Coke Company, who had the larger proportion of the pitch for sale on the London market. He resold the stuff to Mr. Blagden on the 13th of that month at a profit of £56 5s; and on the same day bought it again for the defendant at a further advance in price of 1¼d. a ton. A letter was addressed to Mr. Hanbury Thomas, dated Feb. 26 last, by Mr. Blagden, who wrote: "I shall feel obliged if you will wire me on the enclosed telegram form, first thing to-morrow, your lowest price for 50 tons of sulphate ammonia, and whether you could despatch 20 tons to Goole to-morrow night." He (the Chairman) thought the statement of Colonel Makins had not been borne out, and that the information which had been published justified him (Sir Frederick) in asking the question he did. It was often found that the price of sulphate of ammonia had gone down suddenly. He did not say who had been the cause; but he thought it right to put the inquiry to Colonel Makins. The Chairman went on to refer to a report which had appeared in the papers to the effect that two trains loaded with coal from Scotland, and intended for the Sheffield Gas Company, had passed through Barnsley. He said the report was true; but it should be explained that it was cannel coal, which they were compelled to have. It was their usual stock, and was obtained without any consideration whatever as to there being a strike imminent. The price they paid for it was very high; but they used it in order to maintain the quality of the gas. He concluded by moving the adoption of the report.

Mr. H. HUTCHINSON seconded the motion.

Mr. J. WILSON pointed out that the reserve fund account was stated to be £78,618; but the reserve fund investments were only put down at £42,470. He wanted to know where the remaining £36,000 was—whether it was invested in the works or in some other way.

The CHAIRMAN replied that they employed the money in their business rather than invest it at a low rate of interest; and the Directors thought it was wise policy so to use it at the present time. If they called up capital, they would have to pay 10 per cent. upon it.

The motion was unanimously carried.

On the proposition of the CHAIRMAN, the usual resolution with regard to dividends was passed.

The meeting was then made special, for the purpose of obtaining the consent of the shareholders to the conversion or consolidation of the 11,462 class "E" shares of £8 10s. each (in respect of which the whole of the money subscribed has been paid up) into capital stock, to be called "C" stock.

The CHAIRMAN, in proposing a resolution sanctioning this conversion, said the alteration would simplify the stock of the Company, and be an advantage in all respects; and he thought none of the shareholders would object to it.

Mr. E. HALL seconded the resolution; and it was carried.

On the motion of Mr. J. WILSON, seconded by Mr. A. J. HOBSON, a vote of thanks was passed to Sir F. Mappin for his services in the chair.

The CHAIRMAN, in acknowledging the compliment, said he presumed the proprietors included in the vote the officers of the Company, who had used every effort to attain the successful results achieved. He trusted the Company would always have officials as good, as efficient, and having the interests of the undertaking so much at heart, as their present staff.

The meeting then terminated.

THE GAS UNDERTAKING OF THE STOKE-UPON-TRENT CORPORATION.

Report by Messrs. Alfred Lass, Wood, and Co.

Our readers may possibly remember that, in consequence of certain remarks made a short time ago by the Chairman of the Gas Committee of the Stoke-upon-Trent Corporation, on the comparative cost of gas and the electric light at the consumer's meter, a discussion was raised by a member of the Council, who contested the Chairman's figures. The outcome of the proceedings was that the services of Messrs. Alfred Lass, Wood, and Co. were called in to investigate the question at issue; and their report was presented at the meeting of the Council last Thursday. It dealt with the accounts for the year ending March 31, 1891; and it was accompanied by a reconstructed balance-sheet and a working statement for the year.

The report stated that the cost of gas at the consumer's meter was 19·90d. per 1000 cubic feet, or 19·02d. after deducting the cost of lighting, cleaning, &c., the public lamps. The average price received for the supply of gas for the private lighting of Stoke, Trentham, Hanford, and Trentham Hall was 36·19d. per 1000 cubic feet, leaving a profit of 17·17d. The average price received for gas for public lighting was 31·25d. per 1000 cubic feet, which, after deducting the cost of lighting, cleaning, &c., left a profit of 11·35d. With regard to the supply of gas to the North Staffordshire Railway Company (central station), the average price received was 27d. per 1000 cubic feet, with a profit of 7·98d. per 1000 feet on 7,977,000 cubic feet, or a sum of £265. This, however, did not represent the entire value of the supply, because: (*a*) The gas was supplied in bulk, and passed through a meter fixed close to one of the leading mains of the Corporation; and as the Railway Company distributed it through their own system of mains, any leakage that occurred was entirely borne by the Company. This mode of supplying gas was very different from that which operated in connection with the supply of gas for public lighting, where the leakage was borne by the Corporation. (*b*) Supposing the Company erected gas-works and supplied themselves with gas, the sale of about 8 million cubic feet would not only be taken away, but the Company would in all probability supply 1,999,800 cubic feet to the North Stafford Hotel, the Etruria Railway Station, and other places now supplied by the Corporation, for which a price of 3s. per 1000 cubic feet was paid, and upon which the profit amounted to about £140. (*c*) Supposing the Company supplied themselves with gas, they would not require to purchase of the Corporation such a large quantity of coke, which might adversely affect the profits. (*d*) Supposing the Corporation ceased supplying the Company, the remaining quantity of gas sold would cost proportionately more per 1000 cubic feet, and the leakage per cent. would be proportionately greater.

Upon the question of a sinking fund, the report stated that the Corporation were empowered to borrow £85,000; and Article I., sub-section 1 of the Stoke Provisional Order, 1888, provided that of the £62,700 borrowed prior to March 31, 1888, £41,900 should be repaid within 48 years from November, 1880, and £20,800 within 48 years from November, 1885. Any moneys subsequently borrowed were to be repaid within 50 years from the dates of borrowing. By sub-section 4, it was provided that the first payment of the sinking fund in respect of the £41,900, should be deemed to have been due on or before Oct. 31, 1881; in respect of the £20,800, on or before Oct. 31, 1886; and in respect of subsequent loans, within twelve months after the respective dates of borrowing. The Corporation have raised five loans—viz., £28,000, £15,000, £14,300, and two of £5000 each. The first-named loan is repayable within 30 years, and there has been paid off on account of such loan £4217 13s. 6d.; but nothing has been paid off the other loans. Messrs. Lass and Co. say that, instead of pursuing this course, the Corporation should have established a sinking fund to provide for the payment of £41,900, at 3½ per cent., in 48 years from November, 1880; £20,800, at 3½ per cent., in 48 years from November, 1885; and £4600, at 3½ per cent., in 50 years from December, 1888. The question arose whether the sum of £4217 13s. 6d., which had been paid off the loan of £28,000, was sufficient to provide for a sinking fund for paying off £67,300 within the prescribed periods. The annual instalments amounted to £556; and if they had been invested year by year, and allowed to accumulate at compound interest, they would, on March 31, 1891, have amounted to £5080, as against £4217 loans actually repaid. In fact, there would have been standing to the credit of the sinking fund £863; whereas there was really nothing to the credit of that fund. This £863 should now be taken out of the profit and loss net revenue account, transferred to the sinking fund, and allowed to accumulate at interest as from April 1, 1891.

With regard to the question of a reserve fund, Messrs. Lass and Co. pointed out that amongst the purposes to which the Corporation were required to apply the moneys received from the gas undertaking were the provision of a reserve fund, not exceeding £5000, to be invested in any securities in which by law trust moneys ought to be invested; and finally any balance might be carried to the credit of the district fund. Before any further moneys were taken out of profits and carried to the district fund account, the reserve fund, which only amounted to £2775 11s. 10d., out of £5000, should be filled up. Of this £2775, only £2000 was invested; and there was a question whether this investment was in accordance with the law.

As to the capital expenditure on fixed plant, the report stated that the total amount laid out to March 31, 1891, was £68,338; and the question arose whether any, and if any, what amounts had been placed to the capital account which should have been charged to revenue. This question could not be answered definitely; but the general inference drawn was that, upon the whole, the capital account had not been very unfairly dealt with. During the last five years, there had been an annual average increase in the sale of gas of 4·50 per cent. compound; and if the business continued to increase at the same rate, it would double itself in 15¾ years. With regard to repair and maintenance of works, the report stated that works and plant should be kept well up to modern requirements.

In conclusion, Messrs. Lass and Co. stated that the accounts ought to have been kept in accordance with the form contained in Schedule B of the Gas-Works Clauses Amendment Act, 1871; and that the books of the Gas Department (in which all the accounts ought to appear in proper form and order) required remodelling.

Mr. BENNETT proposed that the report should be considered at a special meeting.

Mr. MARKS seconded the motion, on the ground that, having gone to great expense in having it prepared, it ought not to be rushed through without discussion.

Mr. GEEN (at whose instance the services of Messrs. Lass and Co. were called in) also considered the matter to be far too important to be hurriedly dealt with.

After some further remarks, in the course of which the Mayor (Alderman Kirkham) and the Chairman of the Gas Committee (Alderman Leason) urged that the matter should be proceeded with, it was decided to consider the report at a special meeting next Thursday.

THE GAS SUPPLY OF MANCHESTER.

The Deputy-Chairman of the Manchester Corporation Gas Committee (Mr. Gibson) delivered a lecture, last Wednesday, at Hulme, on the Manchester Corporation Gas Supply. At the outset, he recalled the condition of the city, especially as regarded its lighting, prior to the introduction of gas as an illuminant, and declared that the history of gas had been one of continuous scientific and industrial triumph, in which Manchester had played a most important part. That history he traced in detail, so far as it related to Manchester, from the year 1792 down to the present time. In 1818 the price of gas in Manchester was 14s. 6d. per 1000 cubic feet; and there were seven miles of gas-mains in the streets—the income from the undertaking being £163. People who were now asking for gas at cost price would be interested to learn that an exactly similar agitation was going on in 1824. There were grumblers then as there were grumblers to-day, largely recruited, of course, from the ranks of those who knew least about the subject. He admitted that in recent years the Gas Committee had not kept pace with the times. They ought to have provided more producing power and storeage accommodation five years since. But a few years ago, it seemed very probable that the electric light would become a formidable competitor with gas; and his hearers would doubtless agree with him that the Committee exercised commendable caution in pursuing a waiting policy under those circumstances. The Committee were now taking steps to produce 5 million feet more of gas a day; and they had let contracts for enlarging the holders for an increased storeage, the greater part of which they hoped to have in working order by next winter. In his opinion, the gas consumers of Manchester had very little cause for complaint in the price of gas. Out of 1703 gas companies in great Britain, only six sold gas of the same illuminating power at a lower price than Manchester. Nevertheless, he believed something would soon be done in the way of reduction, although what it would be he was not at present at liberty to say. The value of the land occupied by the gas-works was £228,000, and of the plant £853,984. There were now 682¼ miles of gas-mains and 625 miles of service-pipes, valued at £410,203; 14,511 street-lamps, valued at £9085; and 790,231 meters on hire, valued at £75,676—the whole standing on the books at £1,576,948. The original cost in round figures was 2½ millions; so that besides lighting the streets for nothing, and paying over to the rates large sums of money, the excess of assets of the gas-works over their liability was exactly £841,654. The gross producing power was 21 million cubic feet per day; and the gross storeage, 16 million cubic feet. They had never had storeage room for a day's make of gas; and he for one had strongly protested against this state of things during the whole of the time he had been a member of the Gas Committee. Under the arrangements that were about to be carried out, however, the storeage capacity would be brought up to 25 million cubic feet per day. At present the Committee had 80,000 customers within a 10-mile area; and their turnover amounted to half a million every year. A vote of thanks was accorded to Mr. Gibson for his address.

LEEDS CORPORATION GAS SUPPLY.

A Description of the Works, and Some Statistics as to their Progress.

On the invitation of the Chairman (Alderman Gilston) and members of the Gas Committee of the Leeds County Council, about fifty members of the Corporation visited the borough gas-works last Thursday. The party first went to the New Wortley works, where the Manager (Mr. Smith) explained the different manufacturing operations. A visit was then paid to the meter-stores in Dewsbury Road; and the site adjoining the Meadow Lane works, recently acquired by the Corporation, was next inspected. It is proposed to erect thereon a gasholder of 5 million cubic feet capacity. The party were then conducted through the Meadow Lane works, being accompanied by the Manager (Mr. Tooley), and subsequently through the York Street works, being attended by the Manager (Mr. Townsley). Afterwards the company were entertained to tea by Alderman Gilston.

In view of the above visit, the Chairman of the Gas Committee (Alderman Gilston) and Mr. James Lupton (the Secretary and General Superintendent of the Gas Department) issued, in the form of a neatly got-up volume of about 40 pages, a sketch of the works from the period of their acquisition by the Corporation to the present date. The several works are dealt with separately, those in Meadow Lane being first. It is stated that they cover an area of 5 acres; and since they were transferred from the Leeds New Gas Company to the Corporation, they have been almost entirely reconstructed. Now they are capable of producing about 4,500,000 cubic feet of gas per day. There are 770 retorts, every one of which was in use during the past winter. When all are at work the consumption of coal is at the rate of 430 tons per day. During the past few years, some improved furnaces have been used, with the result that every ton of coal has produced 10,034 feet of gas; whereas in 1886 it only yielded 9664 feet. The total quantity of gas made at these works in 1891 was 918,933,000 feet. The gasholders at the works are of very limited capacity; the two only containing 427,000 feet. In 1878 another holder in connection with the Meadow Lane works was erected in Dewsbury Road, capable of storing 530,000 feet. This was the first of the gasholders constructed with three lifts, of which the Corporation now possess eight. The Council have recently purchased a large plot of land called the Leeds Forge Estate, abutting on Holmes Street, and adjoining the present gas-works, for the purpose of extension when this is necessary. A description of the York Street station is next given. Here there are 380 retorts, which last winter produced an average of 2,121,000 cubic feet of gas per day. Ten years ago the quantity they made was only 1,441,000 feet—an increase of 47 per cent. With regard to the New Wortley works, the largest in the borough, it is stated that they were purchased in 1857 from the Leeds Gaslight Company. The land occupied by the works and holders is 11¼ acres in extent. In the lower works there are 363 retorts, equal to the production of 2,250,000 cubic feet of gas per day; whilst in what are known as No. 2 works, which were started in 1881, there are 892 retorts, which can make 5,500,000 cubic feet. In 1882 the quantity of gas made at these works was 524,007,400 cubic feet; and in 1890 it was more than double, or 1,071,123,900 feet. Mr. W. Suddaby, the Superintendent of the street-mains, gives a report of the department under his control, in which he states that the maximum 24 hours' consumption in 1879 was 7,500,300 feet. The maximum 24 hours' consumption in January, 1891, was 14,139,500 feet. As there is only a total storeage capacity of 10,500,000 cubic feet, or a 16-hours' supply, he is of opinion that to place the distributing apparatus in a state of efficiency, there should be at least a storeage capacity for 24-hours' production during the depth of winter. This would necessitate an increase of gasholder capacity of about 4,500,000 cubic feet. There are in the borough 700 miles of mains, varying in size from 30 inches to 1¼ inches. The area to be lighted is about thirteen square miles. The pamphlet also gives the following interesting particulars: The illuminating power of the gas has been considerably improved since the time of purchase. It is now, and has been since 1888, when the 24-hole burner was adopted for testing purposes, upwards of 19 candles. The sulphur impurity has been reduced from 40 grains per 100 cubic feet in 1880 to an average of 16·36 grains during the year ending June 30 last. The number of meters in use has been increased from 58,700 in 1871 and 67,400 in 1881 to 82,500 in 1891. There are upwards of 1000 gas-engines in use in Leeds varying from ½-horse power to 16-horse power. In June last there were no less than 1105 gas cooking-stoves in operation. A series of tables is given at the end of the book, which show at a glance the great strides which the department has made since it was taken over by the Corporation. In one, as to the cost of coal and labour, it is shown that in the year ending June 30, 1871, 98,878 tons of coal, costing £45,006 (or 9s. 1¼d. per ton), were used, while the wages of the hands employed amounted to £13,483. Since then these figures, except those showing the price of coal, have steadily increased. In the year 1890-91, no less than 240,587 tons of coal were consumed. This cost £144,217; the price being 12s. per ton. During the same period £46,260 was paid in wages. The price of coal has varied from 7s. 7d. in 1881 to 17s. 8¾d. in 1874. Another table shows that the income from residuals per ton of coal carbonized has varied from 3s. 7d. in 1871 to 7s. 7¾d. in 1883. Last year it was 5s. 9¼d. From the capital account, it appears that the amount expended at the time of the purchase was £763,224. To this sum £367,212 has since been added. In 1871 the cost of capital per ton of coal carbonized was £7 16s. 8d.; and in 1891 it was £4 14s.

LEICESTER CORPORATION GAS AND WATER SUPPLY.

The Half-Yearly Accounts.

At a Special Meeting of the Council of the County Borough of Leicester last Tuesday—the DEPUTY-MAYOR (Alderman Kempson) presiding—the accounts of the gas and water undertakings for the half year ended Dec. 31 last were presented.

The Gas Committee reported that their accounts for the half year ended Dec. 31 last showed that the net profit was £11,778. Out of this sum had been paid £2762, the half-year's amount of sinking fund; leaving a balance of £9016, which, added to the balance of net profit (£12,174) for the half year ending June 30, would make a total of £21,190 to be applied to the district fund at the close of the current financial year (the 25th inst.); or from which the Council might, if they were so minded, increase the present reserve fund of £5000, or appropriate or set aside a sum to be applicable for the renewal of works. The net amount realized by the residual products manufacture was £7167. With regard to the gas-fitting business, the half-year's working showed a net profit of £401. The Committee recommended that a sum of £3000 be placed to the gas-works renewal fund, and that the remainder of the net balance, £18,190, be applied to the district fund. During the half year 53,447 tons of coal had been carbonized. The quantity of gas made was 563,214,000 cubic feet, as against 543,017,000 feet in the corresponding half of the previous year; being an increase of 20,197,000 feet, or 3·71 per cent. No. 2 section of the Aylestone Road works had been working at its maximum throughout the winter in a most satisfactory manner; and every portion of the plant had in its working fully realized the expectations of the Committee.

Mr. BILLINGS, in the unavoidable absence, through illness, of the Chairman of the Committee (Mr. Lennard), moved the adoption of the report. He drew attention to the fact that last year the Council allowed the Committee to put £5000 towards the renewal fund. The Committee had thought of asking for £3000 for a similar purpose on the present occasion; but, like all other departments of the Corporation, they were anxious to keep the rates as low as possible, and had accordingly agreed to ask for only £2000. The balance-sheet showed that the work for the past half year had been most satisfactory. The profits showed a decrease of £2015, as compared with the corresponding period last year. It would probably interest the Council and the public to know how much of this decrease was owing to the reduction of the meter-rents and the price of gas in the extended districts. The reduction in the meter-rents was responsible for £634, and the lower price of gas for £459; making a total of £1093. He also reminded the Council that the Committee had not, like many other committees and gas companies throughout the country, increased the price of gas, in consequence of advances in the price of coal and workmen's wages.

The motion having been seconded,

Alderman INSKIP asked for some information with regard to the cause of the strike which recently took place at the Aylestone Road works, and urged the advisability of steps being taken in the near future to reduce the price of gas by at least 2d. per 1000 cubic feet, with the view to more directly benefiting the consumers. He contended that, under the existing system, property owners, and those who compounded for rates, alone received direct benefit.

Mr. HINCKS hoped that, in replying to the discussion, Mr. Billings would be able to give the Council and the town some information as to their present intention with regard to the introduction of the electric light.

Alderman WOOD, in supporting the adoption of the report, emphasized what Mr. Billings had said as to the great increase of expenditure with which the Committee had had to contend, in consequence of the rise in the price of coal and the advances which had been made in the

matter of labour, and gave it as his opinion that, under all the circumstances, the report was a very favourable one, and one upon which the Committee might be fairly congratulated. If they reduced the price of gas, as suggested by Alderman Inskip, they would add to the difficulties of the manufacturers; and he hoped it would be a long time before they saw the price of gas lowered materially, unless they had a corresponding decrease in the cost of coal, on account of the great relief which the present system gave to ratepayers generally in the town.

Mr. EDWARDS thought the arguments which the last speaker had used were most unfortunate. He believed a reduction of 2d. in the price of gas would be a great advantage to manufacturers instead of a disadvantage.

Alderman WOOD: What I mean is that the manufacturers generally are the largest ratepayers in the town; and they would suffer in that direction.

Mr. WAKERLEY fully agreed with the principle laid down by Alderman Inskip; but he asked him whether he knew of any trading concern with an invested capital of three-quarters of a million, the proprietors of which were content with a net profit equal to that which satisfied those who had the sole responsibility of the gas-works upon their shoulders. It must not be forgotten that, whereas now the Gas Committee were making a profit, next year they might make a loss; and he took it that, in such event, the loss would fall not on the consumers but on the ratepayers.

Mr. BILLINGS, replying to Alderman Inskip's question concerning the recent strike, said the men in question were receiving wages quite equal to those paid by other corporations, or private firms, for a similar class of labour; and that the prompt action which the Engineer (Mr. A. Colson) took to fill their places, was fully endorsed by the Chairman (Mr. Lennard) and the Committee generally. As to the electric light, it had proved so unsatisfactory to public bodies who had attempted to adopt it, that the Committee considered that waiting was the safest plan. Every month that they delayed the matter tended to strengthen their position. They would have to adopt it, but they were anxious to defer its adoption until they could satisfy themselves as to the most approved methods.

The motion was then agreed to.

The Water Committee reported that the accounts of the undertaking for the half year ending Dec. 31 last showed a net profit of £8188. Out of this had been paid the sum of £2024, the half-year's amount of sinking fund, leaving a balance of £6164, which, added, to the balance of net profit (£5283) for the half year ended June 30 last, would make a total of £11,448 to be dealt with by the Council at the close of the current financial year. The taxed costs of obtaining the Act of 1890 were £2309, of which £104 had already been paid out of revenue; leaving £2205 to be provided for. A period of not exceeding ten years was allowed by the Act for repayment of these expenses; and the Committee recommended that the amount be paid out of profits during the next five years by equal instalments. The payment for the present year would be £441; and the Committee recommended that the remainder of the above net balance—£11,007—be applied for the benefit of the district fund. The Committee also recommended that the salary of Mr. Griffith, the Resident Engineer and Manager of the undertaking, be increased from £500 to £600 per annum. The quantity of water delivered during the past year within the limits of supply had been 1,207,785,890 gallons; and the average consumption of water per day per head of the population supplied had been 17·64 gallons. This also included the quantity supplied for trade purposes. The number of houses on the books at the end of December was 38,193; giving an estimated population of 190,965.

Alderman WOOD, in moving the adoption of the report, gave some statistics showing that while the water population had nearly doubled since the Corporation acquired the works, the consumption per head of the population had, owing to careful supervision, very materially decreased, and that the financial results had correspondingly improved. As to the proposed increase in Mr. Griffith's salary, the Committee were unanimous in making the recommendation, believing that they were only thereby doing justice to a most efficient officer.

Mr. COLEMAN seconded the motion, which, after a short discussion, was agreed to.

The Hadlow Gas Undertaking.—After having been carried on for upwards of 30 years by the Hadlow Gas, Coal, and Coke Company, Limited, the undertaking has been purchased by a new Company, to be known as the Hadlow Gas Company. Mr. W. A. Williams, late of the Hastings and St. Leonards Gas Company, is Secretary of the new Company, the offices of which are in High Street, Tonbridge.

Southend Gas Company.—At the annual general meeting of this Company next Thursday, the Directors will report a balance of £1159 available for division, out of which they will recommend the declaration of the statutory dividends, which will leave £159 to be carried forward. The receipts for the year were £8151; the expenses, £6441—leaving £1710 to go to the profit and loss account.

Exmouth Gas Company.—The annual general meeting of this Company will be held next Saturday, when the Directors will report a sum of £1213 available for division, and will recommend the declaration of dividends at the rates of 10 per cent. per annum on the "A" stock, and of 7 per cent. per annum on the "B" and "C" stocks, free of income-tax. This will absorb £640; and there will consequently be left a balance of £573 to be carried forward. The total receipts amounted to £4186, and the expenditure to £3223; leaving £963 to go to the profit and loss account. On the whole, the year's working was satisfactory—a result attained mainly by the increased consumption of gas, and the realization of a better price for coke, coupled with the exercise of economy in every department of expenditure. Owing to a falling off in the sales of ammoniacal liquor, and the necessity for disposing of it at a loss, the Directors have decided to erect plant to convert it into sulphate. Other extensions and alterations are about to be carried out in the current year; and for this purpose additional capital has been raised. The Company have been troubled over the re-assessment of their works; the amount having been increased from £436 to £796. The Directors appealed, but without any good result.

THE GAS-WORKS PURCHASE QUESTION AT BIDEFORD.

At a Meeting of the Bideford Town Council last week—the Mayor (Mr. M. Dymond) presiding—the Sub-Committee appointed to consider the gas question presented a further report. It will be remembered that the Council agreed either to name a price, allow the Gas Company to state a price, or leave the matter entirely to arbitration. The reply sent by the Directors was to the effect that a meeting of shareholders considered that the Council had totally ignored the terms of the Directors set forth in their resolution of the 29th ult., as a basis of settlement, and that the Council had therefore closed the negotiations; and that the Directors were instructed by the shareholders to proceed with their application for a Provisional Order, and to communicate the resolution to the Board of Trade. The Sub-Committee, as the result of this reply, recommended the Council to inform the Board of Trade that they considered the construction put upon the matter by the Gas Company was not warranted by the facts of the case. On the other hand, the Corporation had been earnest in their endeavour to arrive at a satisfactory basis for settlement, and that the offer of arbitration, and the alternate scheme of receiving and submitting a price, showed the entire feeling of the Corporation in the matter; that the ratepayers had been twice convened and approved the principle of the gas undertaking being the property of the Corporation; that the Town Council by their resolution of the 9th inst., adopted the principle of arbitration as suggested by the Directors; that it was true the offer was not accepted by the Council within the period stated by the Directors, but the Board of Trade should bear in mind that, in a question of this kind, it was absolutely necessary to convene special meetings of the Council to consider such important matters, and in the interests of the ratepayers to consult them on the subject; that the Council had expressed themselves willing to purchase, leaving all questions to arbitration, but that they considered the demands put into the agreement by the Gas Company in regard to the purchase were such as would be manifestly unfair, and prejudicial to the minds of the arbitrators under either conditions; also to inform the Board of Trade that the Council had been given to understand that, at a meeting of the Company on the 12th inst., a proposal to confer the undertaking upon the Council on payment of £20 per share on the paid-up capital, and £250 in addition to clear all expenses (leaving £20 for each £10 share), was rejected. The report of the Sub-Committee was adopted; and the Sub-Committee were asked to continue their services, and take what measures they thought fit to oppose the granting of an Order to the Company. It was further agreed that a Committee, consisting of the whole Board, should consider the advisability of undertaking the public lighting, and also the plans sent in competition for lighting the town by electricity.

ELECTRIC LIGHTING QUESTIONS AT LIVERPOOL.

The Watch Committee of the Liverpool Corporation, at their meeting on the 7th inst., came to a decision in regard to the proposal to substitute electricity for gas in the lighting of the streets. A report was presented by Mr. H. P. Boulnois (the City Engineer), who had gone very carefully into the subject. After describing the action that had already been taken by the Council, and the results of the experiments that had been made, the Engineer embodied in his report the information he had obtained from other towns, where the electric light is now in use. But the most important part of Mr. Boulnois's statement is that dealing with local areas. He had prepared plans of two areas, one including the whole of the central portion of the city, and the other an equally central but much smaller section. In the consideration of this subject, two things, he said, had to be taken into account—first, the increase in the illuminating power; and, secondly, equal illumination at a reduced cost. As to the best method, he was of opinion that the best electrical system at present known was that of lighting the streets by means of arc lamps of from 1200 to 2000 candle power (nominal) each, placed at such heights and in such positions as would secure the maximum effect of the light. With regard to the probable cost of using the electric light in lieu of the present mode of lighting the city, the experience of other towns, he said, showed that the introduction of electric lights in place of gas-lamps invariably cost more; but this cost was accompanied by greatly increased efficiency of illumination. Mr. Boulnois was of opinion that overhead wiring would not be for one moment tolerated in Liverpool as a permanent means of supplying energy to the lamps; and consequently his estimates were based upon underground cables, and included lamps and standards of an ornamental character. The estimate was as follows—First cost: Electric installation, including land, buildings, machinery, dynamos, &c., cables, arc lamps, and standards, say £35,750. Annual cost: Supplying energy to, and maintenance and cleaning, &c., of lamps for the district bounded by Hanover Street on the one side and Tithebarn Street on the other, less the contribution from the Mersey Docks and Harbour Board for lighting the landing-stage, &c., £7900; interest and sinking fund on £28,650, say £1958—making the total estimated cost per annum £9858. There was some discussion on the report; and eventually the following resolution was passed: "That, pursuant to the resolution of the Council of the 28th of October, 1891, it be reported that the Watch Committee, having considered the question of using the electric light in lieu of the present mode of lighting the city, are of opinion that, having regard to the conditions of rapid development to which the system of electric lighting is now subject, it is not at present advisable to adopt the system in this city."

On the recommendation of the Watch Committee, the City Council, at their recent meeting, passed a resolution to the effect that the Board of Trade should be informed that the Corporation were willing to withdraw their opposition to the Order of the Liverpool Electric Supply Company (see *ante*, p. 263), and to give their consent to it being granted, provided it was amended in accordance with the terms approved of by the Committee. Mr. Hornby, the Chairman of the Committee, explained that this was a fair compromise; the Corporation securing power to purchase the undertaking after the lapse of a certain period. At particular intervals the Board of Trade might be approached, and might alter the mode and amount of payment.

NOTES FROM SCOTLAND.

From Our Own Correspondents.

Saturday.

What, under the Act of Parliament, is called their annual meeting, but the foolishness of so naming it I have before pointed out, was held by the Edinburgh and Leith Gas Commission on Monday. It was arranged to hold the meeting on the day, when the Standing Committees of the Commission usually met; and the effect of the arrangement was that, when the hour arrived, the Committees had not finished their business, and so there would have been nothing to do except to make a correction on the minutes of the previous meeting, had not Mr. Kinloch Anderson introduced the subject of the extension of the Edinburgh works. The subject was before them last year; but it was then held over. It is now, Mr. Kinloch Anderson said, necessary to go on with the extension of the condensing plant, and the erection of new purifiers and a new gasholder. It is estimated that the cost will be over £44,000. The necessity for these works lies in the increased consumption of gas, and the loss in working consequent upon want of accommodation. Bailie Steel, in supporting the proposal, said they had not storeage for one day's consumption, and several foggy days might throw them into darkness. It was agreed that the Works Committee should consider the subject, taking into account that it might be more suitable to construct the new plant at the Leith works, where there is more room than at the Edinburgh works. At the conclusion of the public meeting, the Committees resumed their business. There will now be no meeting of the Commission till the end of April; and therefore this so-called "annual meeting" may be the occasion of some inconvenience.

It is sometimes with a tinge of melancholy that one reads in the daily press of the great things which are being done to advance electric lighting—the melancholy arising from the knowledge that all that is stated is not solid truth, but is often as insubstantial as any "castle in the air." How very seldom does the ordinary newspaper scribe feel called upon to say a good word for gas-lighting? Occasionally, however, there does appear a statement relating to gas-lighting which bears an appreciative tone; and it is all the more refreshing that it is generally a record of hard fact. Such a statement is to-day made by a Dundee newspaper with reference to the output of gas in that city. The estimate for the current year, it is pointed out, was 490 million cubic feet, which was an increase of 20 million cubic feet upon last year; yet, although there are still two months of the year to run, the output at present is nearly 30 million cubic feet above what it was at the same date last year, and the largest which has ever been experienced within a corresponding period. There is also an increase of the gas-rental; but that is a natural consequence of the rise in price which was imposed last year. The important thing is that there has been a so much larger consumption in the face of the rise in price.

The dissatisfaction which has been expressed during the past year or two, both inside the Town Council of Stirling and amongst the ratepayers outside, with regard to the price charged for gas, seems now to have had the effect of inducing the Directors of the Stirling Gas Company to believe that there must have been some good reason for the complaints that were made from time to time; for on Monday it was resolved to reduce the price of the gas from 4s. 2d. to 3s. 11d. per 1000 cubic feet, the reduction to take effect on current accounts from the survey of meters in January last. It is said that this reduction has been rendered possible by some favourable contracts for coal which have been made by the Gas Company.

Gas matters were up before several Burgh Commissions and Town Councils at the monthly meetings held last Monday. The Lighting Committee of the Kirkintilloch Police Commission submitted plans of alterations at the gas-works, whereby the productive and storeage capacity of the works will be considerably increased. The proposed alterations are estimated to cost £2700; and when the improvements are carried out, the works will be in a position, it is believed, to meet the demands of the town for many years to come. The Committee's recommendation was adopted. The Renfrew Town Council agreed to proceed with some contemplated extensions of the gas-works, at an estimated cost of £1650; and for this purpose it was agreed to purchase an adjoining property, at a cost of an additional sum of £1800. I may mention that at Renfrew, as at Kirkintilloch, Mr. James M'Gilchrist is the Gas Engineer appointed to plan and carry out the proposed works extensions. The same gentleman has also been commissioned by the Gourock Gas Commissioners to inspect their gas-works and report as to what extensions are required in order to fit them to provide the increased quantity of gas that is likely to be needed for the rapidly-increasing population of the burgh.

On Wednesday evening the workpeople connected with the Dawsholm and Temple Farm gas-works of the Glasgow Corporation held their first annual social festival in the Burgh Hall, Maryhill. Mr. A. Wilson, Manager of the two stations, occupied the chair, and amongst those who supported him on the platform there were no fewer than five of the Glasgow Town Councillors, Dr. Macdonald, Mr. W. Foulis, and Mr. Key. After tea the Chairman delivered an interesting address. He said that ten years ago at Dawsholm, during the busiest fortnight of the year, the number of men employed was 300, who were paid in the shape of wages for the fortnight the sum of £760. During the corresponding fortnight of this year, however, there were 800 men employed at the works; and their wages amounted to £2030. Then again, ten years ago the annual consumption of coal was 58,000 tons; whereas it has now risen to 130,000 tons. In fact, so great had the demand for gas become, that the Gas Commissioners were under the necessity of largely increasing their plant so as to keep pace with it They were at present putting down a large gasholder, which would contain four times as much gas as the largest of the present holders. Then, also, they were about to start a new retort-house, with all the necessary plant; so that when they got all the new additions ready, their works at Dawsholm would be fully double their present size, and there would be plenty of work in the future for the men to look forward to. Mr. Wilson subsequently addressed the men upon provident clubs, so as to secure medical attendance and pecuniary help in times of sickness or bereavement. Messrs. Foulis and Key also spoke, giving a few words of encouragement to the men and congratulating them upon the good spirit which prevailed amongst them at the Temple Farm and Dawsholm works.

The Paisley Gas Commissioners, as also the consumers of gas throughout the town, have had a very decided "sensation" this week in connection with their local gas affairs, or rather in connection with a most extraordinary and unexpected increase in the gas bills. At a meeting of the Commissioners on Tuesday, the Gas Committee's minutes showed that at a meeting held in Committee, a letter was read from Mr. John Davie, Secretary of the Fifth Ward Committee, stating that various complaints regarding high gas bills had been fully considered by his Committee, who were unanimous in their finding that there was something seriously wrong; for, while the gas was cheaper, the accounts in many cases were almost double what they were formerly. A report on the subject was submitted, which led to a long and serious discussion; and eventually it was remitted back to the Gas Committee for further consideration before taking any action upon it.

Electric lighting business is not likely to be advanced much by an action which was decided by Lord Low in the Court of Session yesterday. The misfortune is that it has received but very scant notice at the hands of the daily press; and in the electrical press it will likely receive less, as its representatives in the Court professed to look upon the action as "a very small matter." A very small matter is sometimes a very significant one; and I look upon this as being in that position. Mr. Henry Grierson, a Glasgow merchant, who occupies a house in the neighbourhood of Edinburgh, in a district where he might easily have had a supply of Edinburgh gas for less than £100, inclusive of fittings, fancied that he would like to introduce the electric light; and he approached Messrs. Mavor and Coulson, of Glasgow, with a request for an estimate of the cost. An estimate was sent in of £1100, "as the cost of fitting up the house with 130 lamps of 16-candle power each, the price to be exclusive of all mason work, foundations for engine and dynamo, and fittings." The estimate led to some cavil by Mr. Grierson, as to additional lamps; and he was assured by the offerers that "they would carry out the work as economically as possible, but they did not bind him to the price." This satisfied Mr. Grierson, and the work was proceeded with. When the account came in, it amounted to £1471 14s. 9d. Of that sum Mr. Grierson paid £1302 4s. 2d., but declined to pay the balance of £169 10s. 7d., because he considered the account was overcharged. It was to recover the balance that the action was brought. His Lordship held the estimate to be only an approximate one; and he gave decree against Mr. Grierson for £128 4s. 2d. That makes Mr. Grierson's initial cost nearly £10 per lamp, which is sufficient to stamp electric lighting as what its friends are willing to have it called—"a light of luxury."

In prosecution of their quest for information as to what is being done in other towns in the matter of electric lighting, a Committee of the Edinburgh Town Council visited Glasgow on Wednesday, where they were met by the Gas and Electric Lighting Committee of the city, along with whom were Mr. W. Foulis, and also Mr. Arnot, the Electrical Engineer. The visitors were shown all that has been done in Glasgow; and had explained to them all that is proposed to be done, with the system and methods to be adopted and the estimated cost.

CURRENT SALES OF GAS-PRODUCTS.

LIVERPOOL, *March* 19.

Sulphate of Ammonia.—The tone of the market has been quiet. But a steady feeling prevails; and there is every appearance as if the lowest point had been reached for the present. Shipments are on a satisfactory scale; stocks do not increase, the production beginning to fall off considerably, and more buyers are turning up; while the sudden advent of warmer and spring-like weather can only tend to stimulate the demand all round. The Hull market is therefore firm at £10 5s.; Liverpool, at £10 2s. 6d.; and a large business is reported at Leith at £10 3s. 9d. to £10 5s. Inquiries for future delivery (summer and autumn this year, and the spring of 1893) are coming up more freely; indicating confidence in this commodity, notwithstanding a falling nitrate market, and the considerably reduced quotations of the latter for summer shipments. This circumstance does not favourably impress buyers with the probability of high sulphate values during the summer; but evidently the fact, that sulphate is really so much cheaper than nitrate, weighs in the balance of opinion, and makes consumers think well of sulphate at current values, independent of any lower range in nitrate. Of course, no producers are willing to sell for forward delivery at present exceedingly low prices; and it seems doubtful whether speculators will run the same risk for late deliveries, which they do already for April-May shipments. Nitrate is now offering on spot at 9s. 3d.

LONDON, *March* 19.

Tar Products.—Benzols are flat; and the small quantity that has been sold during the week is at a lower price. There is very little business doing in any of the other tar products; and although pitch is being largely shipped, it is chiefly on account of the sales made last year. Two large contracts for tar have been made during the week—one at 12s. 9d., and the other at 14s. There is a little inquiry for carbolic acid; but buyers are offering less money than it can be produced at. Anthracene continues neglected; and the prices below are nominal. Stocks are accumulating; and it is more than likely that an offer considerably below the price quoted would lead to business. Prices are: Tar, 13s. Pitch, 30s. Benzol, 90's, 2s.; 50's, 1s. 6d. Toluol, 1s. 4d. Solvent naphtha, 1s. 3d. Crude benzol naphtha, 30 per cent., 10½d. Creosote, ¾d. Naphthalene salts, 20s.; pressed, 45s. Carbolic acid, crude, 60's, 1s.; 70's, 1s. 4d. Crystals, 4¾. Cresol, 8d. Anthracene, 30 per cent., "A" quality, 11d.; "B," 8d.

Sulphate of Ammonia.—Sales are only possible at continually lower prices. There is an extraordinary absence of demand, taking into account the time of the year. It is expected, however, with better weather that buyers will purchase more freely. There are large stocks in makers' hands; and it is difficult to obtain more than £10, less 3½ per cent. Gas liquor (10 oz.) sells at 5s. 6d. to 7s.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—Except that collieries in most cases have on hand a large number of unexpected orders for the better qualities of round coal, which will probably take them two or three weeks to clear off, the coal-trade of this district, after the absurd and unnecessary excitement produced by the colliers' holiday stoppage of a week, may now be said to have got back into something like its normal condition. As anticipated, the Miners' Conference in London, decided not to prolong the stoppage beyond the week; and at a special meeting of the coalowners of Lancashire and Cheshire, held in Manchester on Thursday, it was practically agreed not to place any difficulties in the way of a resumption of work. The collieries throughout this district consequently resume their regular operations this week; and the exceptional prices which have recently been ruling, will necessarily speedily disappear. During the last few days, the new business coming forward has been extraordinarily small; and for the most part collieries have been doing little more than making deliveries on account of orders already placed, whilst in a good many instances consumers have got in large extra supplies which will meet their requirements considerably beyond the resumption of the regular output of the pits. Prices are already showing a very decided downward tendency; but for the present they are so very irregular, that definite quotations are scarcely reliable. Many of the leading firms have continued all through to supply their regular customers at the old rates; but in the open market all descriptions of round coal have been maintaining a substantial advance. Even now it would be difficult to place orders for best Wigan-Arley at under 13s. per ton, with Pemberton four-feet and second qualities ranging from 10s. 6d. to 11s. 6d. per ton, and common round coals at 9s. 6d. to 10s. per ton, at the pit mouth. Engine classes of fuel—owing to the increased quantity of slack that has been screened from the coal, in filling up out of stock—have been offering more freely in the market. Prices for these have been rapidly giving way—representatives of collieries in some instances pushing sales at fully 1s. per ton under recent quotations—and with the prospect of continued excessive supplies in the market, prices will no doubt quickly recede to something like old rates. At present, burgy may be readily bought at from 7s. 6d. to 8s. per ton; the better qualities of slack, at 5s. 6d. to 6s.; and common sorts, at about 4s. to 5s. per ton, at the pit mouth. For shipping coal, owing to the temporarily limited supplies, exceptional prices have been obtained; and for delivery at the Garston Docks, or the High Level, Liverpool, 14s. 6d. has been paid to secure prompt deliveries of ordinary descriptions of steam coal.

Northern Coal Trade.—There is still excitement in the Durham coal trade, though the recommencement of work by the Midland collieries has lessened it. The Northumbrian miners have continued at work throughout, and have produced very large quantities of steam coal, and comparatively heavy deliveries of gas coal for the few pits in that county that yield this class. Prices of steam coal shot up to 14s. per ton, but are now falling again; and there was a considerable quantity of Northumbrian coal sent out of the county for use as household coal at even higher prices. The gas coals that were produced naturally found a ready market in the absence of the supplies from Durham. After contracts were met, sales up to 10s. 6d. per ton were recorded on the first day of the strike; and on the following day 13s. was paid, and a still higher price asked. But it is obvious that such prices could be only for small lots, because the amount of uncontracted coal was limited. Household coal fluctuated in value—as high as 19s. per ton, delivered in Newcastle, was charged in some instances. Indeed, for certain classes of coal, where supplies were essential, it has been more a question of obtaining them in time than of price. But this is passing away; and the starting of the midland pits will throw surplus coal into Durham until the end of the strike there. Coke has been very scarce; and as high as 20s. per ton at the ovens has been paid for best Durham furnace coke. Gas coke has been a little more sold for household purposes; but it is still abundant, and the stoppage of some works has lessened the consumption for manufacturing purposes. The effects of the strike, indeed, will long be seriously felt on the Tyne and Wear and at Middlesbrough.

West of Scotland.—There is an absence of excitement in the coal trade in this district. Good business has been done, shipping to Ireland being particularly brisk, while a good many orders have been received from ports on the North-west coast of England. In connection with small coals, a better demand prevails for nuts. Prices are irregular; but the following are the rates at which business can be done at Glasgow harbour: Splint, 9s. to 9s. 6d. per ton f.o.b.; main coal, 8s. 3d. to 8s. 6d.; steam, 10s. to 10s. 6d.; ell, 8s. 6d. to 9s. 6d. The shipments of Scotch coal last week reached a total of 129,487 tons—an increase, compared with the corresponding week last year, of 13,217 tons. The increased shipments have been principally coastwise. For the year up to last Saturday, the shipments total to 1,086,858 tons—an increase of 164,054 tons over the corresponding period last year.

Bristol Water Company.—The Directors of this Company have resolved to recommend dividends for the half year ending the 31st of December last at the rate of 7¼ per cent. per annum on the ordinary shares, and at the rate of 5¼ per cent. per annum on the 7 per cent. maximum ordinary stock.

Buenos Ayres Water Supply and Drainage Company.—Mr. Justice North last Tuesday delivered judgment on the petition presented by this Company for the approval of a scheme of arrangement, under which certain bonds of the Argentine Government, delivered over in consideration of the concession being put an end to, and the works transferred to the Government, were to be allotted to the holders of debenture scrip and preference shares. The scheme was opposed by holders of ordinary shares, who contended that the contracts in question were *ultra vires*, and that the arrangement was made by Messrs. Baring in their own interest. His Lordship, however, after going through all the details of the matter, overruled the objections, and sanctioned the scheme as asked by the petition.

Increased Storeage for the Ashton Local Board Gas-Works.—The Gas Committee of the Ashton Local Board have come to the conclusion that increased storeage accommodation is necessary at their works; and they have appointed Mr. J. Timmins, the Gas Engineer of the Wigan Corporation, to carry out the work.

Increased Storeage Capacity at the Truro Gas-Works.—The Truro Gas Company are about to increase the storeage capacity of their works by the erection of an additional telescopic holder, capable of containing 60,000 cubic feet of gas, with a cast-iron tank. The work has been entrusted to Messrs, Willey & Co., of Exeter.

Important Extensions of Gas Plant.—Messrs. R. Dempster and Sons, Limited, of Elland, report that the prospects for manufacturers of gas plant for the current year are exceptionally good; a large number of inquiries (particularly for retort-house extensions) having already been received. The firm have recently secured a contract for a 40,000 cubic feet per hour rotary exhauster, with engine combined, for the Chorley Corporation.

New Water-Works for Mansfield.—A special meeting of the Mansfield Town Council was held last Wednesday, to consider the question of providing an additional water supply for the town. The existing works were purchased for about £20,000 a few years ago; and they have now become unsatisfactory. A new scheme has been propounded by Mr. Hodson, C.E., to carry out which an expense of about £25,000 would be incurred. Objection was taken to this undertaking; the Ratepayers' Association particularly urging that a sufficient supply could be obtained at the existing works if an additional boring was made. The question was fully considered by the Council; and eventually a resolution was adopted which embodied modifications of Mr. Hodson's scheme; and he was instructed to carry it out at a cost not exceeding £20,000.

Exhibitions of Gas Appliances.—An exhibition of gas appliances was opened last week in the crypt of the Town Hall, Middlesbrough, by Alderman Hugh Bell, J.P., Chairman of the Corporation Gas Committee. The stoves and lamps shown were supplied by Messrs. Richmond and Co., Limited, of Warrington and London, who also had a display at Southport, in which town an exhibition was at the same time held by Messrs. John Wright and Co., Limited, of Birmingham. Messrs. Richmond and Co. have commenced a series of exhibitions in the London district—the first being opened last week at Putney, where Mr. Elsener (a Swiss *chef*) and Mrs. Bennett gave lectures on cookery. This firm have just appointed Mr. Arthur Mead, Assoc. M. Inst. C. E., as their representative in the East and South-West of England, and South Wales.

The Career of a Steady Gas Stoker.—Nearly 40 years ago, one of the stokers at the York Gas-Works, named Robert Robson, left that city for the United States. He was a man of very steady habits; and therefore he attracted the attention of the present Manager, Mr. Charles Sellers, who was then a clerk; and an unbroken friendship was maintained between them. Robson landed in America with the intention of going to Buffalo; but as he had not the means of paying his travelling expenses, he walked by way of the track of the Grand Trunk Railway—occasionally working amongst the farmers by daylight, and lodging where he could at night. In this way, he finally reached Buffalo. He was a brickmaker by trade, but preferred gas stoking; and on arriving at Buffalo he went straight to the gas-works, and was put on to his favourite occupation. Here again his sobriety and intelligence were soon noticed by the Manager, who in a short time promoted Robson to the position of a foreman, from which he rose to that of Superintendent, and finally was made Manager. This latter position he held for a number of years, until he saw his way to turning his old brickmaking knowledge to account. He bought land and machinery, and became one of the principal brickmakers in Buffalo. Some five or six years ago, having made sufficient money to supply all his wants, he decided to give up business. He visited England four times after he first left it; and never failed to call on his old friend, Mr. Sellers, at the York Gas-Works. He took great interest in the working classes; and regarded drink as the greatest curse in society, and education as its greatest blessing. A short time ago he had an attack of paralysis, to which he succumbed on the 25th ult., at the age of 72.

The Newtownards Gas Undertaking.—As an instance of a successful gas undertaking, attention may be directed to that of the Newtownards Town Commissioners, the practical supervision of which is in the hands of Mr. A. Waddell. The works were purchased rather more than seven years ago at a cost of £9386, to pay which, and provide office furniture and stores, a sum of £10,000 was borrowed. Of this amount, £1750 had been repaid at the close of last year, and £1200 added to the capital of the concern out of revenue. The renewal account has been abnormally large—viz., £1438—partly owing to the fact that the retorts have been completely changed since Mr. Waddell took office, and the regenerative system adopted. Mr. A. Silverthorne gave the average production for three years, in his report recommending the purchase of the works, at 8128 feet per ton, less leakage 27·77 per cent., or 5872 cubic feet net sold. The present make is 10,000 cubic feet per ton, less 12 per cent. leakage, or 8775 feet sold; being an increase of nearly 3000 feet per ton. The residuals account has been about doubled. It may perhaps be asked: What has been done with the profits? The consumers had the first claim, and the price of gas was gradually reduced from 7s. 6d. to 4s. 2d. per 1000 cubic feet, with discounts to large consumers varying from 2½ to 12½ per cent. This has resulted in a saving to them, since the purchase of the works, of £6766; and the quality of the gas has been improved from 16 to 18 candles. Then the workmen have not been forgotten; for their wages have been raised 20 per cent., and in one instance by 33⅓ per cent. The Manager's salary has also been increased by 20 per cent. In putting these facts before the Commissioners, the Chairman of the Gas Committee said he did not believe this record could be broken in the history of any gas-works in Ireland. Their debt was smaller, the value of the premises had been increased, the gas consumers had upwards of £6000 in their pockets by reductions in price, the workers' wages had been considerably advanced, and the Committee had kept up their payments regularly and punctually.

The Liverpool Corporation and the Gas Company's Bill.—On Monday last week, a conference took place between the Parliamentary Committee of the Liverpool City Council and representatives of the Liverpool United Gaslight Company on the subject of the Company's Bill now before Parliament. The provisions of the measure were fully considered; and the Company agreed to certain modifications with reference to the proposed erection of additional gasholders. As the result of the discussion, the Committee decided to recommend the Council to withdraw their opposition to the Bill.

New Joint Stock Companies.—The Upton-on-Severn Gas Company, Limited, has been registered with a capital of £5000, in £5 shares, to carry on the business of gas supply at Upton-on-Severn, Worcestershire. The Durham Coke and Bye-Products Company, which has been registered with a capital of £25,000, in £100 shares, is to acquire the right, title, and interest of Messrs. Simon, Carvès, Pernolet, and Mallet, under a contract made with Mr. S. A. Sadler, of Middlesbrough, and generally to carry on the business of carbonizing coal and manufacturing the residual products therefrom.

Hunts and Godmanchester Gas Company.—At the recent annual meeting of this Company, the Directors reported that the business of the half year ending Dec. 31 had been very satisfactory. The accounts showed that £1199 was available for dividend. As the Company have no working capital, they had been obliged to defray current expenditure out of the money earned last year. It was to avoid this difficulty that the Directors recommended in their previous report that no dividend should be then declared; but they now proposed the payment of a dividend of 8 per cent., free of income-tax. The retort-settings, they stated, had been re-constructed; and a new main had been laid down in Huntingdon, at a cost of £831, which had been defrayed partly by £500 raised on mortgage, partly by £250 raised by the sale of Consols from the reserve, and the remaining £81 from revenue.

Reduction in the Price of Gas at Carmarthen.—A letter was read at last Tuesday's meeting of the Carmarthen Town Council from the Directors of the Gas Company, in which they intimated their willingness to reduce the price of gas. Last year it was raised 6d. per 1000 cubic feet for private consumption, which enabled the Directors to pay a dividend for the past year of between 4 and 5 per cent. The Company now stated that they would reduce the charge to the private consumers from 5s. to 4s. 10d., and that to the town to 4s. 6d. net, from the 31st inst. At the previous meeting of the Council, it was decided to put out every alternate lamp at twelve o'clock at midnight, and thus save £100 a year, if the Company would not reduce the price to 4s. 6d., less 5 per cent. discount; and, now, after a protracted discussion, it was only agreed, by the casting vote of the Mayor, that the Company's offer be accepted.

Harrow District Gas Company.—The half-yearly report of the Directors of this Company has been circulated among the shareholders by the Secretary (Mr. J. L. Chapman). In the first place, the Board refer, with sincere regret, to the death of the Deputy-Chairman (Mr. John Chapman), who was the largest proprietor in the concern, a Director from its formation, and was always greatly interested in its progress and prosperity. The Directors do not, at present, recommend that the vacancy be filled up. The balance of the profit and loss account is £1989, out of which the Directors recommend the declaration of a dividend at the rate of 7½ per cent. per annum on the original "A" capital, of 7 per cent. on the first additional "B" capital, and of 5½ per cent. on the second additional "C" capital, all less income-tax. The accounts show that the receipts from gas and from meter and stove rental amounted to £4255, which is nearly £260 more than in the corresponding period of the previous year. The residual products realized £769, which was about the same as in 1890. Coke yielded less; but the deficiency was made up by the extra amount received for tar and sulphate of ammonia. The total revenue was £5025; and, deducting expenditure, a profit is left of £1689, compared with £1715.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

(For Stock Market Intelligence, see ante, p. 527.)

Issue.	Share	When ex-Dividend.	Dividend or Bonus.	NAME	Paid per Share	Closing Prices.	Rise or Fall in Wk.	Yield upon investment.
£			p. c.	GAS COMPANIES.				£ s. d.
590,000	10	15 Oct.	10½	Alliance & Dublin 10 p. c.	10	16–17	..	6 3 6
100,000	10	,,	7½	Do. 7 p.c	10	11½–12½	..	6 0 0
300,000	100	2 Jan.	5	Australian (Sydney) 5 % Deb.	100	105–107	..	4 13 5
100,000	20	27 Nov.	8	Bahia, Limited	20	12–14	..	11 8 1
200,000	5	12 Nov.	7½	Bombay, Limited	5	6½–6¾	..	5 11 6
40,000	5	,,	7½	Do. New	4	4¾–5¼	..	5 14 1
380,000	Stck.	26 Feb.	12½	Brentford Consolidated	100	205–215	..	5 14 1
150,000	,,	,,	9½	Do. New	100	153–158	..	5 17 1
220,000	20	11 Mar.	11½	Brighton & Hove Original	20	39–41[*]	..	5 12 2
888,500	Stck.	11 Mar.	5	Bristol	100	95–100[*]	..	5 0 0
320,000	20	15 Oct.	11½	British	20	43–45	..	5 0 0
50,000	10	26 Feb.	11½	Bromley, Ordinary 10 p. c.	10	19–20	..	5 15 0
51,510	10	,,	8½	Do. 7 p. c.	10	14–15	..	5 13 4
328,750	10	—	—	Buenos Ayres (New) Limited	10	6–7	+½	—
200,000	100	2 Jan.	6	Do. 6 p. c. Deb.	100	93–96	..	6 5 0
150,000	20	26 Feb.	8	Cagliari, Limited	20	24–26	..	6 3 1
550,000	Stck.	15 Oct.	13*a*	Commercial, Old Stock	100	244–249	..	5 4 5
765,000	,,	,,	10*a*	Do. New do.	100	190–195	..	5 2 7
130,000	,,	30 Dec.	4½	Do. 4½ p. c. Deb. do.	100	118–123	..	3 13 2
800,000	Stck.	30 Dec.	13	Continental Union, Limited	100	221–226	..	5 15 1
200,000	,,	,,	10	Do. 7 p. c. Pref	100	185–195	..	5 2 7
75,000	Stck.	16 Sept.	10	Crystal Palace District	100	190–200	..	5 0 0
486,090	10	29 Jan.	10	European, Limited	10	19–20	..	5 0 0
354,060	10	,,	10	Do. Partly paid	7½	14–15	..	5 0 0
5,470,820	Stck.	12 Feb.	12	Gaslight & Coke, A, Ordinary	100	211–216	+1	5 11 1
100,000	,,	,,	4	Ds. B, 4 p. c. max.	100	94–97	..	4 2 5
665,000	,,	,,	10	Do. C, D, & E, 10 p.c. Pf.	100	244–249	..	4 0 4
30,000	,,	,,	5	Do. F, 5 p. c. Prf.	100	116–121	..	4 2 9
60,000	,,	,,	7½	Do. G, 7½ p. c. do.	100	169–174	..	4 6 2
1,300,000	,,	,,	7	Do. H, 7 p. c. max	100	150–154	..	4 10 11
463,000	,,	,,	10	Do. J, 10 p. c. Prf.	100	241–246	..	4 1 3
476,000	,,	,,	—	Do. K, 6 p. c. Prf.	100	145–150	..	4 0 0
1,061,150	,,	11 Dec.	4	Do. 4 p. c. Deb. Stk.	100	113–116	..	3 9 0
294,850	,,	,,	4½	Do. 4½ p. c. do.	100	118–123	..	3 13 2
908,000	,,	,,	6	Do. 6 p. c. do	100	163–168	..	3 11 5
3,800,000	Stck.	12 Nov.	12	Imperial Continental	100	221–225	+1	5 6 8
75,000	5	26 June	6	Malta & Mediterranean, Ltd.	5	4–4½	..	6 13 4
560,000	100	1 Oct.	5	Met. of Melbourne, 5p. c. Deb.	100	108–110	..	4 10 11
541,920	20	27 Nov.	6½	Monte Video, Limited	20	14¼–15½	..	8 7 8
150,000	5	27 Nov.	10	Oriental, Limited	5	8¼–8¾	..	5 14 3
60,000	5	30 Sept.	7	Ottoman, Limited	5	4–5	..	7 0 0
166,870	10	26 Feb.	2	Pará Limited	10	2¾–3¼	..	—
420,000	100	3 Nov.	6	People's Gas of Chicago— 1st Mtg. Bds.	100	100–105	..	5 14 3
500,000	100	1 Dec.	6	2nd Do.	100	100–105	..	5 14 3
150,000	10	15 Oct.	10	San Paulo, Limited	10	9–10	..	10 0 0
500,000	Stck.	26 Feb.	15½	South Metropolitan, A Stock	100	266–271	..	5 14 5
1,350,000	,,	,,	12	Do. B do.	100	220–225	..	5 6 8
200,000	,,	,,	13	Do. C do.	100	232–237	..	5 9 8
725,000	,,	30 Dec.	5	Do. 5 p. c. Deb. Stk.	100	138–143	..	3 10 0
600,000	Stck.	11 Mar.	11½	Tottenham & Edm'nton, Orig.	100	—	..	—
				WATER COMPANIES.				
729,331	Stck.	30 Dec.	10	Chelsea, Ordinary	100	230–240	−10	4 3 4
1,720,560	Stck.	15 Oct.	8	East London, Ordinary	100	190–200	−5½	4 0 0
544,440	,,	30 Dec.	4½	Do. 4½ p. c. Deb. Stk.	100	136–140	..	3 4 3
700,000	50	11 Dec.	8	Grand Junction	50	90–95	−5	4 4 3
708,000	Stck.	12 Feb.	10½	Kent	100	250–260	−5	4 0 10
1,043,800	100	30 Dec.	9½	Lambeth, 10 p. c. max.	100	210–213	−6	4 8 4
406,200	100	,,	7½	Do. 7½ p. c. max.	100	185–190	−2	3 19 0
260,000	Stck.	30 Sept.	4	Do. 4 p. c. Deb. Stk.	100	120–123	..	3 5 0
500,000	100	12 Feb.	12½	New River, New Shares	100	325–335	..	3 12 4
1,000,000	Stck.	29 Jan.	4	Do. 4 p. c. Deb. Stk	100	125–128	+1	3 2 6
902,300	Stck.	30 Dec.	6½	S'thwk & V'xhall, 10 p. c. max.	100	135–140	−2½	4 12 10
126,500	100	,,	6½	Do. D 7½ p. c. do.	100	140–145	..	4 9 8
1,155,066	Stck.	11 Dec.	10	West Middlesex	100	235–245	−4½	4 1 7

a Next dividends will be at this rate. *Ex div.

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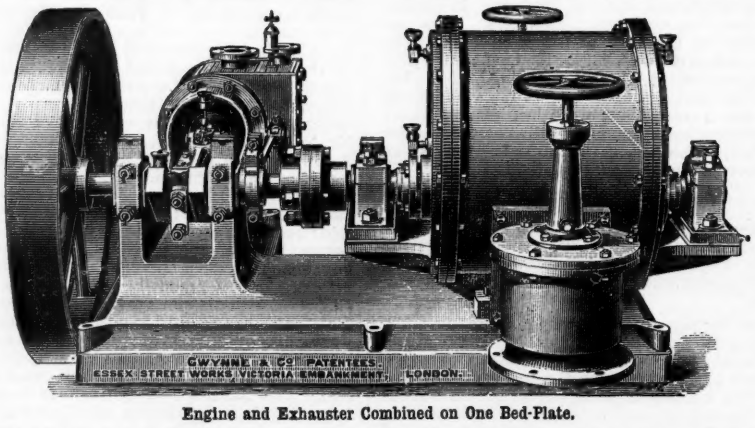
They have never sought to make price the chief consideration, but to produce Machinery of the very highest quality.

The result is that in every instance their work is giving the fullest satisfaction.

They have completed Exhausters to the extent of 30,000,000 cubic feet passed per hour, which are giving unqualified satisfaction in work, and can be referred to.



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ADVERTISER requires an engagement as WORKING MANAGER in Gas-Works, Public or Private. Can take entire charge. Married, no family. Good references.

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WANTED, a sober and competent Man as GAS-FITTER and SERVICE LAYER.

Apply, at once, to the MANAGER, Gas-Works, NUNEATON.

WANTED, Dry Gas-Meter Tinmen.

Must be steady, reliable men.

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*** See Advertisement p. 553 of this week's issue.

Cablegrams: "Ignitor London." Telegrams: "Holmes Huddersfield."

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First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.

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BROTHERTON AND CO., Ammonia and Tar Distillers, LEEDS and WAKEFIELD.

SUBSCRIBERS to the Masonic Charities are reminded of the case of the Son of the late Bro. FRANK HENRY HARRIS; and are asked to kindly RESERVE THEIR VOTES for this Candidate. The case was referred to in the JOURNAL OF GAS LIGHTING for the 16th ult. (p. 293); and proxies may be sent to Bro. J. ELY, Gas-Works, ABINGDON, or to the Office of the JOURNAL, when they will be duly acknowledged.

CAISTOR GAS AND COKE COMPANY, LIMITED.

THE Directors of the Caistor Gas and Coke Company, Limited (making over 2 million cubic feet of Gas per annum), require the services of a WORKING MANAGER, to be entrusted with the entire charge of the Works, to keep the Yard-Books, and take Indices of Meters. He must also have a practical knowledge of Interior Fittings, &c.

Applications, stating age, experience, and salary required, with testimonials as to character and fitness, to be addressed to me, in applicant's own handwriting, on or before the 6th day of April next.

No one need apply who is not fully competent to undertake the duties of the situation, and who is not a thoroughly sober and attentive man of business.

F. B. COUSANS,
Secretary.

Caistor, Lincolnshire,
March 19, 1892.

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WORKS SUPERINTENDENT.

WANTED, by the Directors of this Company, an experienced and competent man to act as SUPERINTENDENT at their Effingham Street Gas-Works. He will be required to reside on the Works, with House, Coal, and Gas free.

The maximum make of Gas at this Station is about 3½ million cubic feet per day.

Applications (marked "Superintendent"), stating age, previous engagements, and salary required, to be made by letter only, addressed to Sir Fredk. T. Mappin, Bart., M.P., Chairman of the Company, Gas Offices, Sheffield, not later than Saturday, March 26, 1892.

Testimonials not to be sent till asked for.

HANBURY THOMAS,
General Manager.

Commercial Street, Sheffield,
March 5, 1892.

WANTED, a Small Gasholder, from about 18 feet to 25 feet diameter; also a Small CENTRE-VALVE, about 4 inches.

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EXHAUSTER.

WANTED, a good Second-hand EXHAUSTER, about 20,000 cubic feet per hour, complete with Valves and Compensator.

Address, stating Maker's Name and other particulars, with Price at nearest Railway Station, to P. INNES, 11, Bothwell Street, GLASGOW.

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THE Royal Agricultural Hall Company, Limited, Islington, have FOR SALE one 500-LIGHT DRY METER, and one 200-LIGHT DRY METER, which until recently have been used at the Hall, and are in good working order.

Apply to R. VENNER, Secretary, Royal Agricultural Hall Company, Limited, ISLINGTON.

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FOR SALE—A Set of Four Dry LIME PURIFIERS, 6 feet square by 3 feet deep, with 8-inch Hydraulic Centre-Valve and Connections, having Cover and Valve, and Lifting Apparatus on top of Centre-Valve.

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Particulars from ALEXR. WADDELL, Manager.

PETERBOROUGH GAS COMPANY.

A TELESCOPIC Gasholder for Sale— Outer Lift, 50 ft. diameter by 18 ft. deep; Inner Lift, 49 ft. 2 in. diameter by 18 ft. deep; Eight Cast-Iron Columns and Wrought-Iron Girders. The same to be removed from the Works by April 30, 1892.

The Directors invite TENDERS for the above, to be addressed to the Chairman of the Company, and delivered not later than April 11, 1892.

J. BARTON,
Secretary and Manager.

March 19, 1892.

IRISH BOG ORE OXIDE OF IRON.

GAS PURIFICATION.

BALE, BAKER, & CO., direct Importers from Ireland. Sample and Price on application. OXIDE PAINT, SULPHURIC ACID, & Chemicals.

120 and 121, NEWGATE STREET, LONDON, E.C.

SULPHURIC ACID.

JOHN NICHOLSON & SONS, Chemical Works, LEEDS, specially produce this ACID from BRIMSTONE, for making SULPHATE OF AMMONIA of high quality and *good* colour. Delivery in our own Railway Tank-Wagons or Carboys. Highest references and all particulars supplied on application.

OIL for the "Wells" or "Lucigen" Lamps.

HARDMAN AND CO., Miles Platting, MANCHESTER.

COZE'S Automatic Apparatus for CHARGING AND DISCHARGING GAS-RETORTS. For Illustrated Advertisement of this System, see p. 557.

Inquiries should be addressed to THE AUTOMATIC COAL-GAS RETORT COMPANY, LIMITED, 86-88A, LEADENHALL STREET, E.C.

DRAWINGS, Tracings, Specifications, Quantities, &c., prepared by an experienced Engineering Draughtsman. Plans of Works made, copied, or enlarged. Blue copies made. Illuminated Addresses in first-class style. Writings of all kinds, Engrossments, &c.

Address J. L. FEATHERSTONE, 173, Fentiman Road, LONDON, S.W.

LIQUID FUEL.

TAR Oils, Naphthalene, Oil Residues, Tar, Petroleum, &c. SADLER'S PATENT BURNER is the simplest and most effective. No smoke; no Ashes.

For particulars and price of Burner and Cheap Oils, apply to SADLER AND CO., LIMITED MIDDLESBROUGH.

TENDERS are invited for the supply of a number of small GASHOLDERS (200, 300, 500, and 1000 cubic feet), complete with Tanks, Pillars, Weights, &c.

Address the ILLUMINATING, HEATING, AND POWER GAS COMPANY, LIMITED, 23, John Dalton Street, MANCHESTER.

THE Directors of the Tewkesbury Gas Company, Limited, are prepared to receive TENDERS for the supply and erection of a SINGLE-LIFT GASHOLDER, 69 feet diameter by 20 feet deep; also for the construction of a GASHOLDER TANK in Brick, 72 feet diameter, Stand Well, &c.

Drawings and Specifications may be seen on application at the Gas-Works, Tewkesbury.

Sealed tenders, endorsed, to be sent to John Price, Esq., Chairman, on or before Monday, April 4, 1892.

The Directors do not bind themselves to accept the lowest or any tender.

By order,
JOHN SURL,
Manager, &c.

March 14, 1892.

BOROUGH OF DEWSBURY.

SCRUBBER-WASHER.

THE Corporation hereby invite Tenders for the Supply, Construction, and Erection complete of a new SCRUBBER-WASHER (equal to dealing with a maximum daily production of 2,000,000 cubic feet of Gas) at their Savile Gas-Works, Dewsbury.

Further Particulars and Forms of Tender may be obtained from Mr. Chas. A. Craven, Engineer and Manager of the Works.

The Corporation do not bind themselves to accept the lowest or any tender.

No allowance for estimates.

Sealed tenders, endorsed "Tender for Washer-Scrubber," to be sent to the undersigned, not later than Three p.m. on Monday, the 4th day of April, 1892.

E. MAWDESLEY,
Town Clerk.

Town Clerk's Office,
Town Hall, Dewsbury.

EDINBURGH AND LEITH CORPORATIONS GAS.

THE Commissioners invite Tenders to supply GENERAL STORES (PIPES, PAINTS, TIMBER, &c., &c.) required at their Works in Edinburgh and Leith, during the year from the 15th of May next.

Tender Forms and all information can be had on application to the Engineers at these Works.

Offers must be lodged not later than Ten o'clock on Wednesday Forenoon, the 30th current, in Sealed Envelopes, addressed to the undersigned.

The Commissioners are not to be bound to accept the lowest or any Tenders.

JAMES M'G. JACK,
Clerk.

25, Waterloo Place, Edinburgh,
March 15, 1892.

GAS PLANT.

THE Trustees for the District and Harbour of Maryport invite TENDERS for the supply and erection complete at their Gas-Works, Maryport, of the under-mentioned Apparatus—viz., One set of ANNULAR CONDENSERS, Two PURIFIERS with Lifting Apparatus, the removal and re-erection of a SCRUBBER-WASHER, the LINING of an AMMONIACAL LIQUOR TANK, RETORT MOUTHPIECES and FITTINGS, One WASHER, One GAS EXHAUSTER, and one STATION METER.

Specification, with Form of Tender, may be obtained on application.

Tenders, endorsed "Tender for Gas Apparatus," to be sent to the undersigned not later than Noon, on Friday, the 1st of April next.

The lowest or any tender will not necessarily be accepted.

F. KELLY,
Clerk to the Trustees.

Town and Harbour Offices,
Maryport, March 7, 1892.

MESSRS. DEBENHAM, TEWSON, FARMER, and BRIDGEWATER'S MONTHLY LIST of Shops, Show-Rooms, Factories, and Waterside Premises, suitable for the Exhibition and Manufacture of Engineering and other Appliances, may be obtained, free of charge, at their Offices, 80, CHEAPSIDE, E.C.

CORPORATION OF ILKESTON.
(GAS DEPARTMENT.)

NEW OXIDE. SPENT OXIDE.

TENDERS are invited for 75 tons of OXIDE OF IRON, delivered free at Ilkeston Town Station.

Also PRICES for about 110 tons of SPENT OXIDE, placed in Trucks at Ilkeston Town Station.

Samples or other information on application.

F. C. HUMPHRYS,
Engineer and Manager.

Gas-Works, Ilkeston,
March 15, 1892.

BRIGHOUSE LOCAL BOARD.

TO GASHOLDER MAKERS.

THE Brighouse Local Board invite TENDERS for the Excavator's, Concretor's, and Engineer's Work required in the erection and completion of a WROUGHT-IRON ANNULAR TANK and THREE-LIFT TELESCOPE GASHOLDER, 120 feet diameter by 25 feet deep, at their Gas-Works, Brighouse.

Plans and Specification may be seen, and Bill of Quantities obtained, upon application to the undersigned.

Sealed tenders are to be sent in, addressed to Frederick Laxton, Esq., Chairman of the Local Board, Public Offices, Brighouse, endorsed on the outside "Tender for Gasholder and Tank," and are to be delivered on or before Tuesday, the 5th day of April, 1892.

The Local Board do not bind themselves to accept the lowest or any tender.

JAMES PARKINSON,
Engineer and Manager.

Public Offices, Brighouse,
March 12, 1892.

BOROUGH OF BURTON-UPON-TRENT.

SERVICE TAR AND LIQUOR TANK.
CONTRACT No. 12.

THE Mayor, Aldermen, and Burgesses of the Borough of Burton-upon-Trent, acting by the Council, invite TENDERS from competent persons for the Supply, Construction, and Fixing of a new CAST-IRON SERVICE TAR and AMMONIACAL LIQUOR TANK, with Pump, Pipes, Valves, and other Works incidental thereto.

Full Particulars and Copies of Conditions, Specification, and Bill of Quantities, with Form of Tender, may be obtained, and the Drawings viewed, on payment of One pound (which will be returned on receipt of a *bonâ fide* tender), on application to the Gas Engineer, Mr. F. L. Ramsden, Gas-Works, Burton-upon-Trent.

Sealed tenders, endorsed "Service Tar and Liquor Tank," are to be delivered to me at or before Ten a.m., on Thursday, the 31st day of March inst.

The Council do not bind themselves to accept the lowest or any tender, nor will they pay any expense or charge relating to the making or delivery of the same.

T. N. WHITEHEAD,
Town Clerk.

Burton-on-Trent,
March 15, 1892.

COUNTY BOROUGH OF BURNLEY.

TO COLLIERY PROPRIETORS AND OTHERS.

THE Gas Committee of the Corporation of Burnley are prepared to receive TENDERS for One, Two, or Three years, from the 1st of July next, for the supply of 3000 tons per annum of CANNEL COAL, to be delivered in such monthly quantities as the Gas Manager of the Corporation may from time to time require.

The Coals must be of good quality, dry; and as free as possible from Sulphur, Bats, Bind, Refuse, and Dirt; and must be delivered into the Wagons of the Corporation at their Wharf on the Leeds and Liverpool Canal, adjoining the Gas-Works.

Any person or persons tendering may be required to send samples of the Coals offered, at the quoted price, before the contract is let.

Tenders must be made upon a form to be obtained on application to me.

They must be sealed, and specify fully the description of the Coals and the Pits at which they are to be raised, and must be addressed to the Chairman of the Gas Committee, Town Clerk's Office, Burnley, endorsed "Tender for Cannel," and posted not later than Wednesday, the 30th of March, 1892.

By order,
ROBERT E. FOX,
Town Clerk.

Town Hall, Burnley,
March 11, 1892.

Sale of 584 Gas and Water Shares in the following Undertakings:—

Crystal Palace District Gas Company,
West Ham Gas Company,
North Middlesex Gas Company,
Woking Water Company,
Romford Gas Company,
Waltham Abbey and Cheshunt Gas Company,
Harrow District Gas Company.
West Kent Gas Company,
Ilford Gaslight and Coke Company.

MR. ALFRED RICHARDS will Sell the above BY AUCTION, at the Mart, E.C., on Tuesday, April 5, at One precisely, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

MESSRS. Wheatley and Mackenzie beg to say that they have acquired the business of the late W. H. BENNETT, Esq., and that having a special experience in matters connected with Gas, Water, and Sanitary Improvement, will continue to give the same assistance to Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, or LETTERS PATENT.

Patents completed or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.

Patents procured for Foreign Countries.

Information as to cost, &c., supplied gratuitously upon application to WHEATLEY AND MACKENZIE, 40, Chancery Lane, LONDON, W.C.

WILLIAM HENRY BENNETT, DECEASED.

PURSUANT to the Act of Parliament, 22 & 23 Vic., Cap. 35, all Creditors and others having any Claims against the ESTATE of WILLIAM HENRY BENNETT, late of 54, Chelsham Road, Clapham, Surrey, and 22, Great George Street, Westminster, Middlesex, Consulting Engineer, who died on the 7th of February last, and whose Will was proved in the Principal Registry of the Probate Division of the High Court of Justice, on the 10th day of March, 1892, by us the undersigned, the Executors therein named, are hereby required to send PARTICULARS in writing of the DEBTS, CLAIMS, or DEMANDS to us, at No. 315, Edgware Road, London, W., on or before the 18th of April, 1892, after which date we shall proceed to distribute the Assets of the said Deceased amongst the persons entitled thereto, having regard only to the Debts, Claims, and Demands of which we shall then have had notice.

Dated this 18th day of March, 1892.

FRANK W. BENNETT.
C. V. BENNETT.

315, Edgware Road, London, W.

BRITISH GASLIGHT COMPANY, LIMITED.

NOTICE is hereby given, that the Half-YEARLY ORDINARY GENERAL MEETING of the Proprietors of this Company will be held at this Office on Wednesday, the 30th inst., at half-past Twelve o'clock precisely, to transact the usual Business, and to declare the Dividend for the Half Year ended the 31st of December last.

Notice is hereby also given, that the Transfer Books of the Company will be closed on the 19th, and reopened on the 31st inst.

By order of the Court of Directors,
FREDERIC LANE LINGING,
Secretary.

Chief Office: No. 11, George Yard,
Lombard Street, London, E.C.,
March 11, 1892.

ALBO-CARBON LIGHT COMPANY, LIMITED.

FOR SALE
(To CLOSE A TRUST ESTATE)

TEN Shares of £50 each (£30 paid) of the above Company. Dividend for last Three years, 7½ per cent.

Apply to WEBSTER, WILL, AND RITCHIE, 37, Queen Street, EDINBURGH.

L. MONK & CO.,
Cannel and Gas Coal Merchants,
34, ST. ANDREW SQUARE,
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PRICE'S PATENT COKE & COAL BARROW

effecting a great saving of time labour, and expense.

For particulars, price &c., apply to Mr E. PRICE, Inventor and Patentee, 22, Alwyne Road Canonbury, LONDON, N.

Prices are Reduced.

ROBERT MARSHALL,
CANNEL COAL MERCHANT,
97 WELLINGTON STREET, GLASGOW.

Prices and Analysis of all the Scotch Cannels on application.

CAST-IRON PIPES
FOR GAS AND WATER.

Pipes, One to Six inch Bore, kept in Stock. Also a very large assortment of all sizes of Bends, T-pieces, and Specials ready for despatch on receipt of Order.

VALVES
FOR GAS, WATER, AND STEAM

TELEGRAMS "PIPES GLASGOW."

WM. MACLEOD & CO.,
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JAMES OAKES & Co.,
ALFRETON IRON-WORKS, DERBYSHIRE,
AND
Wenlock Iron Wharf, 21 & 22, Wharf Road,
CITY ROAD, LONDON, N.

Manufacture and keep in Stock at their Works (also large stock in London)
PIPES and CONNECTIONS, 1½ to 48 inches in diameter; and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas Water, Railway, Telegraph Chemical, Colliery, and other Companies.

NOTE. — Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with bolts, nuts, and covers, and rendering leakage impossible.

COKE BREAKERS.

G. R. Mather & Son, Engineers, Wellingboro'.

FIRE-BRICKS.

FIRE-CLAY.

JAMES WHITE & Co., Limited,
Albert Oil-Works,
WIDNES, LANCASHIRE,

Sole Proprietors of the Largest and Purest Beds of Fire-Clay in England.

FOR GAS FURNACES our GANNISTER and SILICA FIRE-BRICKS are acknowledged to be the best and most durable in the market.

GANNISTER and SILICA FIRE-CLAY guaranteed of the Purest and Finest Quality.

ANALYSIS AND REFERENCES ON APPLICATION.

THE SILICA FIRE-BRICK COMPANY,
OUGHTIBRIDGE, near SHEFFIELD,
MANUFACTURE
SILICA BLOCKS,
BRICKS, AND CEMENT
OF SUPERIOR QUALITY
FOR GAS-FURNACES.

Trade Mark: "SILICA."

These Goods (largely used in Gas, Glass, Iron, and Steel Works) are, on account of their
GREATER DURABILITY,
Strongly recommended where EXCESSIVE HEATS have to be maintained.

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Have erected Gasholders of all dimensions, during the last 40 years, in all parts of Great Britain, and throughout the civilized world, for upwards of 500 Gas Companies and Municipalities; all of the best materials and highest class of workmanship.

They are now erecting a four-lift Holder of about 8 MILLION cubic feet, at the Beckton Gas-Works, London.

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10, Finsbury Square, London, E.C.

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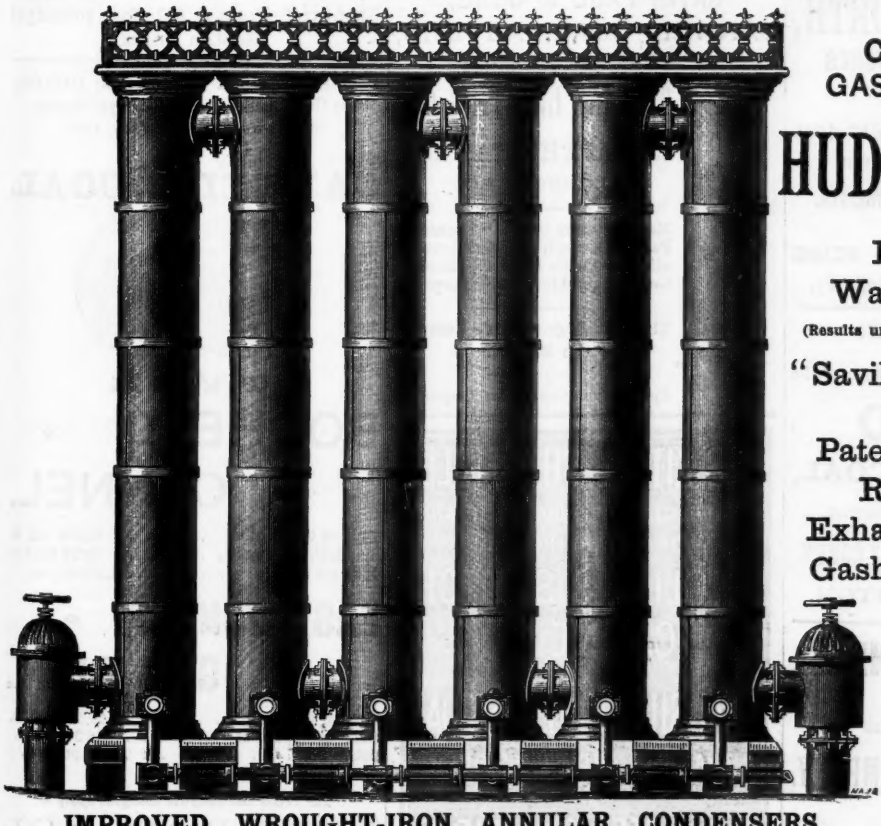

IMPROVED WROUGHT-IRON ANNULAR CONDENSERS,
WITH WING VALVES, TO REGULATE THE CONDENSING POWER.

CONTRACTING GAS ENGINEERS,

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Patent Rotary Washer-Scrubbers
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"Saville's" Patent Tar Extractors,
Patent Regenerative Retort-Settings,
Exhausters, Purifiers,
Gasholders (any size),
Valves, and
All Requisites
FOR
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Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.
Proprietors of
BEST GLASSHOUSE POT & CRUCIBLE CLAY.
SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

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Cannel and Gas Coal Merchants,
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MEIKLEJOHN'S PATENT
Improved Slide-Valve Anti-Dip.
Is perfectly reliable in action, and requires no attention. Has all the advantages of the Dip and Anti-Dip combined.
Is cheap and easily fixed to any form of main.
Will be found the most efficient appliance of the kind yet introduced.
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SEARCHES made *re* novelty, and opinions given on all matters connected with above. *Full particulars on application to*
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Special experience in Gas and Ammonia Plant.

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Near HALIFAX,
MANUFACTURER OF SULPHURIC ACID
OF EXTRA QUALITY FOR MAKING
WHITE SULPHATE OF AMMONIA.
TAR, LIQUOR, AND SPENT OXIDE
Purchased for Cash against Delivery.

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Gas Companies are solicited to try Samples of the
MIRFIELD
BLACK BED GAS COAL.
Prices and Analysis on application.
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NEWBATTLE CANNEL.
QUOTATIONS ON APPLICATION TO
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NEWBATTLE COLLIERIES,
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HOLMSIDE GAS COALS.
(Wrought out of Holmside and South Moor Collieries.)
PRESENT production nearly 3000 tons per working day. Area of coal about 5000 acres, including the largest remaining workable proportion of pure HUTTON SEAM GAS COAL. Analysis of HOLMSIDE GAS COAL *in bulk as shipped* gives 10,500 cubic feet of Gas per ton, of an Illuminating Power of 16¼ candles. The Sulphur is about 1 per cent., and the Ash 1¾ per cent. The Coal cokes well, and leaves 69 per cent. of excellent Coke. During the year 1890, the London Gas Companies carbonized about 400,000 tons of HOLMSIDE COALS. They are used by The Gaslight and Coke Company, the South Metropolitan Gas Company, the Commercial Gas Company, the Woolwich (Government) Gas-Works, the Newcastle and Gateshead Gas Company, the European Gas Company, the Ipswich Gas Company, and by many other Gas Companies both at Home and Abroad.
MR. MARK ARCHER,
HOLMSIDE AND SOUTH MOOR OFFICES,
NEWCASTLE-ON-TYNE.

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DORTMUND (GERMANY).
REGENERATIVE FURNACES.
Unsurpassed in
Efficiency, Economy, Durability, and Easy Working.

ROSEWELL BOGHEAD.
Yield of Gas per ton . . . 13,215 Cub. Ft.
Illuminating Power . . . 37·56 Candles.
GAVIN PAUL & SONS,
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Manufacturers of the "Thomas" Patent Lamps for general lighting, also for Public Buildings, Institutions, &c., and for outside purposes.
The best Regenerative Lamp in the Market.
Special quotations to Gas Companies.

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LANEMARK CANNEL AND GAS COALS.
Quotations and Analysis on application to
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Shipping Ports: All the principal Scotch Ports.

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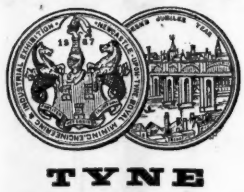

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Yield of Gas per ton . . . . . 13,155 cub. ft.
Illuminating Power . . . . . 38·22 candles.
Coke per ton . . . . . 1,301·88 lbs.
EAST PONTOP GAS COAL.
Yield of Gas per ton . . . . . 10,500 cub. ft.
Illuminating Power . . . . . 16·3 candles.
Coke . . . . . 70 per cent.
For Prices and complete Analysis, apply to
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Hislop's Patent Producer and Patent Charging Appliances offer advantages which are unapproachable; while in every other detail his Settings are confidently recommended as being the most inexpensive and effective possible.

Illustrated Pamphlet and Terms on application to J. E. FISHER, Stourbridge, Agent for England and Wales; to C. M. HAMILTON, Portland Place, Hamilton, Agent for Scotland and Ireland; and for all other Countries to the Patentee,

Geo. R. HISLOP, Gas Engineer, PAISLEY, N.B.

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OF EVERY DESCRIPTION.

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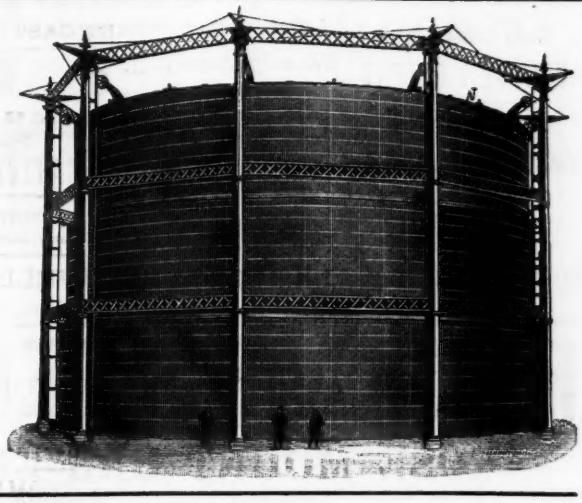

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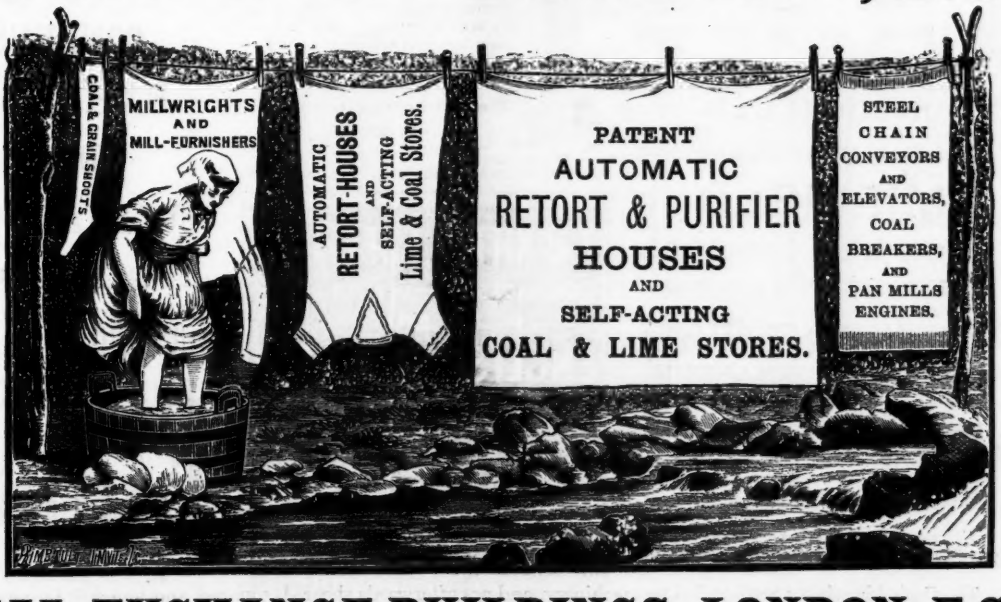
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STEEL CHAIN CONVEYORS AND ELEVATORS, COAL BREAKERS, AND PAN MILLS ENGINES.

1, METAL EXCHANGE BUILDINGS, LONDON, E.C.

"THE METEOR."

NEW HIGH-POWER GAS-LAMP.

Westphal's Patent.

Gas Companies should hire these Lamps to their Consumers, and introduce them for Street Lighting as a rival to the Electric Light, as they do not get out of order, are most economical, and the Burner being a circular slit does not choke up.

Particulars and Prices Free.

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153 TO 155, CANNON STREET,
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TELEGRAPHIC ADDRESS, "GAS LEEDS."

60, QUEEN VICTORIA STREET, E.C. LONDON OFFICE.

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MAKE

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OF ALL FORMS AND SHAPES
IN IRON OR STEEL
BY SPECIAL HYDRAULIC
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Sole Licensee of
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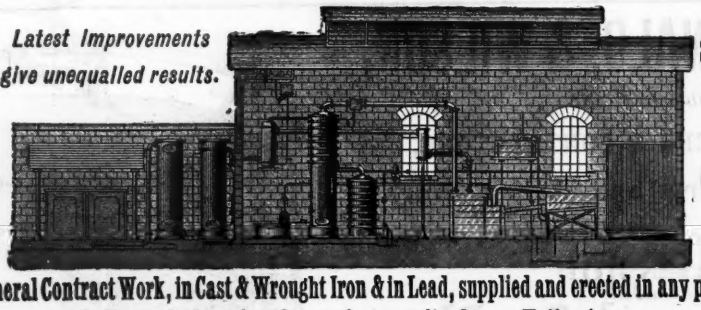
SULPHATE OF
AMMONIA DISCHARGER.
OVER 50 APPARATUS WORKING.

Latest Improvements give unequalled results.



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CONSTRUCTION.
REFERENCES, &c., ON APPLICATION.

Gas-Making Apparatus & General Contract Work, in Cast & Wrought Iron & in Lead, supplied and erected in any part of the United Kingdom.
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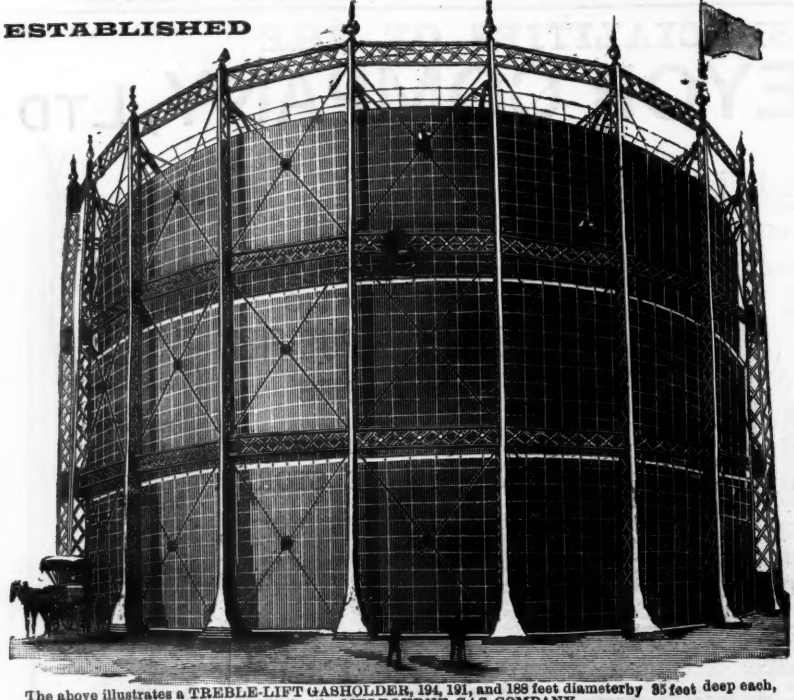

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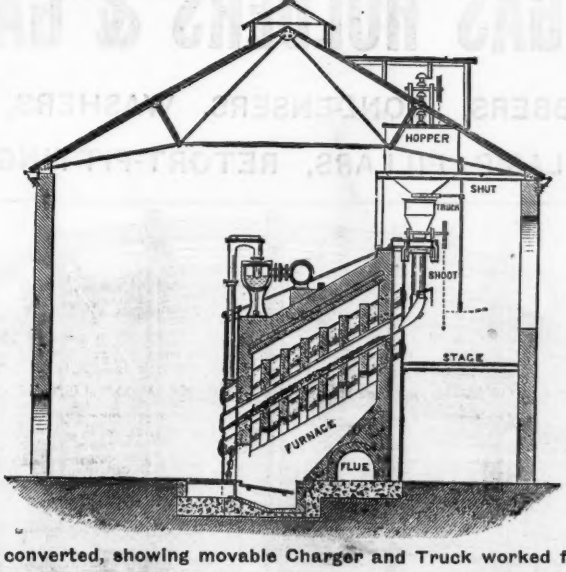

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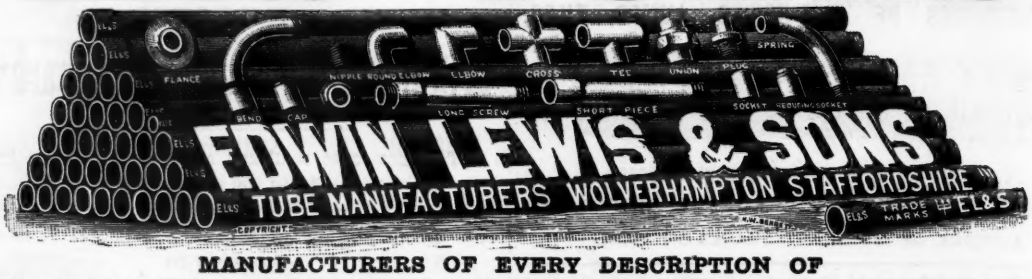

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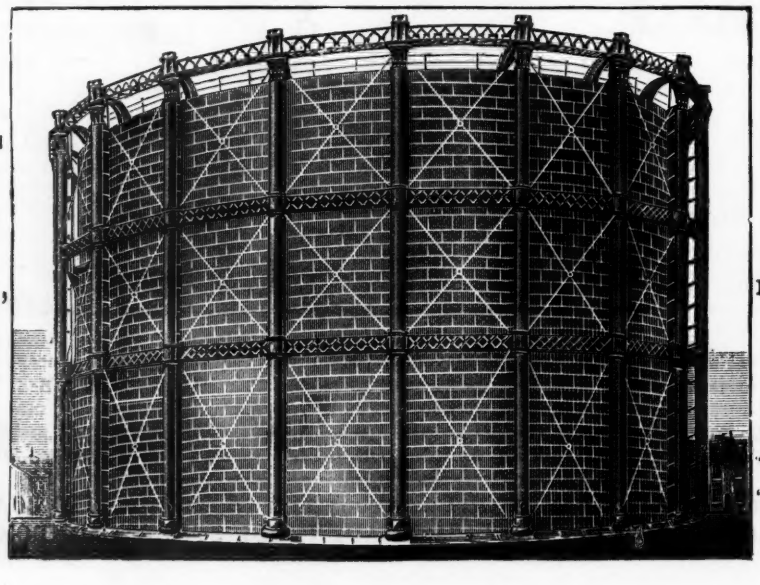

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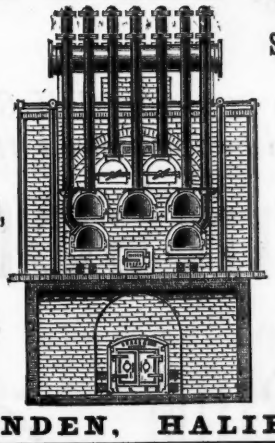

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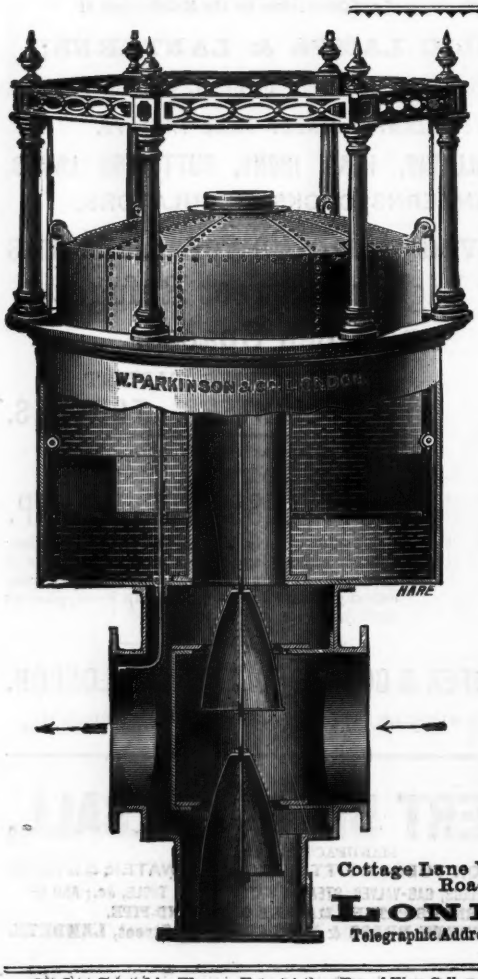

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[See also Advt., p. 522.

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